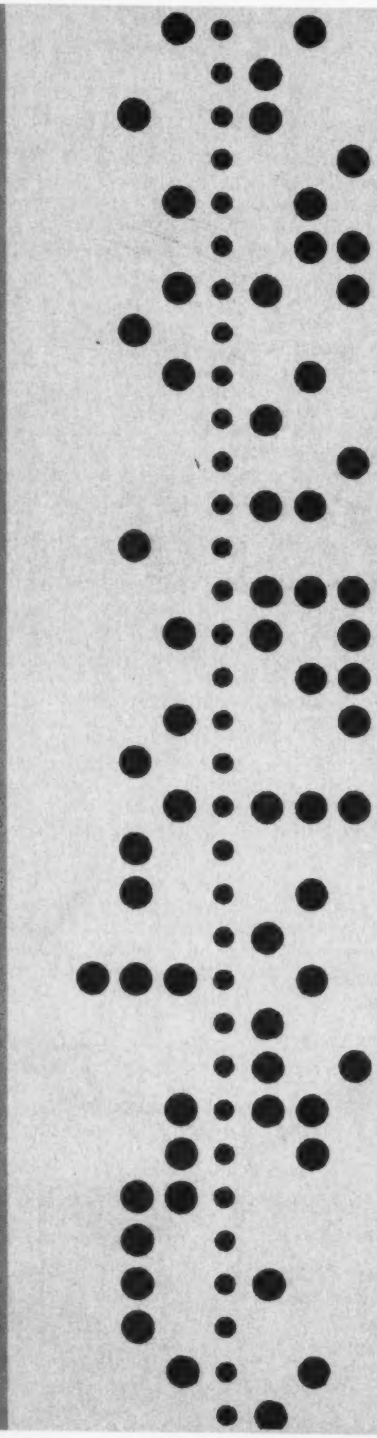
U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS

June 20, 1965



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RESEARCH AND DEVELOPMENT REPORTS

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PURPOSE

U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS (formerly U.S. Government Research Reports) is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability to the public of new reports of U.S. Government-sponsored research and development released by the Department of Defense and other Federal agencies. The Atomic Energy Commission and the National Aeronautics and Space Administration issue their own announcement journals as noted below.

FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by accession/report number under 33 subject division headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes. Reports of current high industrial interest are featured in **"Research Highlights."**

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting accession/report numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject divisions; the various indexes will aid in locating those reports. Cumulative indexes are published periodically.

TO ORDER REPORTS

Order reports by accession/report number (as given on the first line of each entry) and title from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche copy (MF) are given for each entry. Prepayment is required unless purchases are to be charged to Superintendent of Documents deposit account. Order forms will be found in the back. Make check or money order payable to National Bureau of Standards—CFSTI.

OTHER JOURNALS

Reports of the National Aeronautics and Space Administration and the Atomic Energy Commission can be ordered from the Clearinghouse. Reports available are listed in the following journals open to public subscription from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NUCLEAR SCIENCE ABSTRACTS, Atomic Energy Commission, $30 a year domestic, $37 foreign, $1.75 single copy plus 25 percent foreign mailing.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $33 a year domestic, $42 foreign, $2.25 single copy plus 25 cents foreign mailing.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated.
Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

RESEARCH highlights

Reports of current high industrial interest

Categories

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Biological and Medical Sciences

RADIOACTIVE IODINE RENDERED LESS HARMFUL

Radioactive iodine as a major fallout nuclide "can be rendered less harmful by intelligent manipulation of our biological environment," say AEC-sponsored radiologists at the University of Rochester. They add that just two grams of stable iodine added to the daily diet of the dairy cow can reduce the radioactive iodine output in milk by 50 percent. In the report, the radiologists note that milk is the most important source of contamination, the grazing animal consuming the radio-iodine from contaminated pastures. Humans can be similarly treated to reduce the thyroid uptake from 22.5 percent to about 5 percent. The Rochester study's special interest is in the isotope I-131 since it is produced in significant abundance, possesses an appropriately long half-life (8.05 days), and is the only isotope of iodine entering the food chain of man in sufficient quantity to merit attention. The report gives a unified picture of the factors with which health physicists must be concerned in the event of environmental release of I-131 through nuclear weapons tests, nuclear reactors, and reactor fuel processing plants. These atmospheric releases can be followed and their deposition can be predicted to a reasonable extent with the proper meteorological knowledge. Experience has shown, however, that actual ground surveys are ultimately essential for the assessment of the seriousness of the event. Order from the Clearinghouse UR-653, HC $3.00/MF 75 cents; HAZARD TO MAN FROM I-131 IN THE ENVIRONMENT.

Control Systems and Instrumentation

ADAPTIVE SAMPLING FOR PROCESS CONTROL

A technique known as adaptive sampling permits a digital computer to be used for process control only a fraction of the time, but it maintains system control specifications adequately. Thus the computer can be shared with other operations or experiments. The technique is defined to be that choice of constant prediction period which will satisfy control specifications over a specified range of system conditions. The complete range of system operation is divided into a number of classes for which criteria can be devised for determining when the system is in each class. The prediction period in each class is not smaller than that required over the range of the operation of the class. Among other applications, Iowa State Ames Laboratory atomic researchers are using the technique in a process that controls a continuous stream of radioactive atoms in an isotope separator, so that decay characteristics can be investigated. Order from the Clearinghouse IS-995, HC only, $4.00; ADAPTIVE SAMPLING IN DIGITAL CONTROL.

Electronics

SUPERIOR UHF RECEIVER DESIGNED FOR 200-400 Mc RANGE

An experimental UHF receiver recently designed for the Air Force is a significant improvement over existing receivers in the frequency range of 200-400 Mc. This breadboard device outperforms the present R-361A in all RFI measurements and it is lighter, more flexible, and in general is quite superior, according to American Electronic developers. Several auxiliary items prepared for use with the new receiver also give outstanding performance. A band rejection filter has proved a useful tool in notching-out undesired signals; a radio frequency interference rejector eliminates interference from nearby transmitters; and a helical resonator significantly improves front end selectivity. The experimental work also developed additional basic information on a dielectric tube antenna, contributing to a more complete understanding of its operation. Order from the Clearinghouse AD-613 072, HC $4.00/MF 75 cents; FUTURE RECEIVER CONTROL TECHNIQUES.

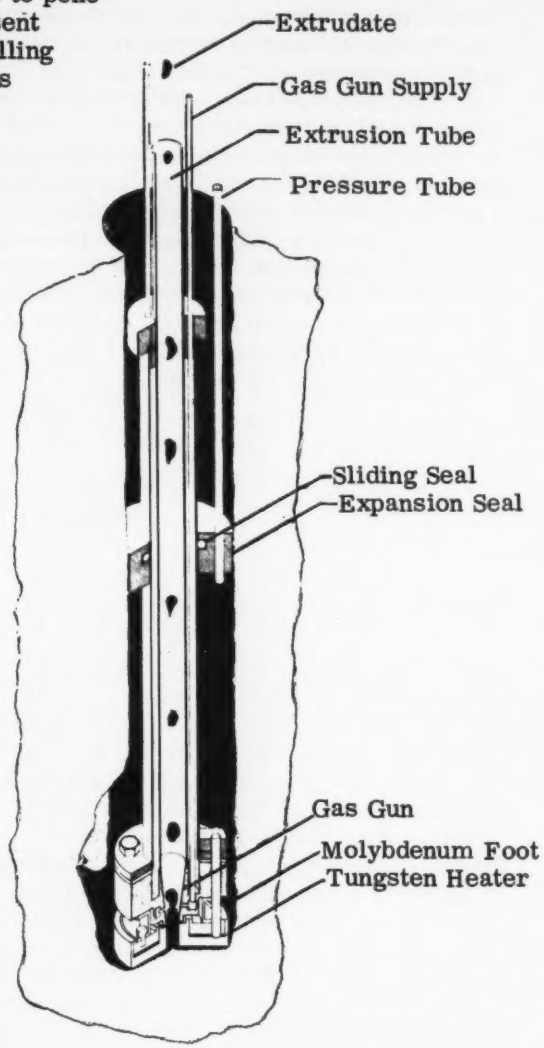
Information Technology

REMOTE CONSOLES TO ACCESS TIME-SHARING FACILITY

An experiment in information system design at the Massachusetts Institute of Technology uses remote consoles to access a time-sharing computer facility. The system lets a searcher sit at an electric typewriter, scan a stated range of literature, and perform a search based on key words, key word in context, citation index, bibliographic coupling, author, location, and various combinations of these. The response is printed back on the same typewriter within seconds of the request. The interaction between the user and the system is free of intermediaries and it is accomplished by means of a language very close to natural English. The prototype system was built under sponsorship of the National Science Foundation, ARPA, and the Office of Naval Research. It consists of five major components—a sample literature, computer facility, library of programs, population of users, and a test and monitor procedure. Order from the Clearinghouse AD-608 502, HC $2.00/MF 50 cents; THE M.I.T. TECHNICAL INFORMATION PROJECT: I. SYSTEM DESCRIPTION.

ROCK MELTING AS A DRILLING TECHNIQUE

Drills that penetrate hard rocks by melting them have been constructed and successfully tested by researchers of Los Alamos Scientific Laboratory. The drilling devices are especially adaptable to penetrate hard low-melting rocks which present special difficulties with conventional drilling methods. A host of potential applications exist for the devices in mining and excavating for oil and minerals, quarrying, and tunneling in many industrial and engineering operations. The lava is removed in continuous fashion by constraining it to flow into a central orifice and carrying it away in a high-velocity gas stream. Developers at Los Alamos say the common refractory metals exhibit excellent strength and resistance to corrosion at the temperatures needed for rock melting. Molybdenum drills were electrically heated to temperatures high enough to melt rock (1300°C) in most of the drilling experiments conducted, but tungsten has greater strength and corrosion resistance at such temperatures. The researchers accomplished drilling of rocks at a power consumption of 1 kcal/cm^3 and at rates up to 0.02 cm/sec (50 ft/day). Conventional drilling methods are sometimes as slow as 4 feet per day in dense hard rock. The researchers applied the heat electrically at the rate of 15 volts and 150 amperes from a small commercial welding transformer. A tungsten plate heater at the base of the drill heats to incandescance and transmits the heat to the molybdenum drill bit. Order from the Clearinghouse LA-3243, HC only,$2.00; ROCK MELTING AS A DRILLING TECHNIQUE.



A typical thermal drill.

Metals, Ferrous and Alloys

MORE ACCURATE ULTRASONIC TESTING APPARATUS FOR STEEL

A superior ultrasonic testing apparatus for steel that uses a pulse-echo procedure has been developed by the Army. More accurate than any method now in use, it can separate steel specimens according to their grain structure and thus can serve as a useful indicator of mechanical properties. For example, it can be used to examine test specimens for proper heat treatment. Metallurgists say this spectroscopic test method offers several advantages over the multiple-echo attenuation procedure now in use. It is much faster, it provides a reliable built-in reference level to check coupling conditions, and results are not influenced in an uncontrollable manner by the load effect of the transducer upon the surface encountered in direct-contact testing. Special electronic circuitry provides improved uniformity of transducer frequency response with the result that a frequency range of 3 to 12 mc can be covered. Army researchers also say it is possible to discriminate between grain sizes in steel varying from 2 to 8 (ASTM scale) on the basis of ultrasonic attenuation spectra observed. Order from the Clearinghouse AD-614 113, HC $1.00/MF 50 cents; ULTRASONIC SPECTROSCOPY OF STEEL.

Nuclear Technology

ROLE OF SAFETY IN OPERATION OF RESEARCH REACTORS

In-depth information on research reactors with emphasis on their operating and safety experience has been compiled for the Atomic Energy Commission. The publication gives the history, methods of operation, and experience with the physical systems of ten reactors now being operated by national laboratories and universities for experimental purposes. The publication notes that there is wide variation between these reactor facilities in terms of specific subjects discussed and the detail of material presented. Such differences are to be expected, however, in a study of reactors ranging in size and complexity from the WPI reactor to those in the CP-5 and MITR class. "The ground rule for selecting source data was to focus on experience relevant to nuclear safety," says the publication. "However, no attempt is made to define what constitutes safety experience. For example, to adopt criteria which associate nuclear safety with biological injury would lead to little added knowledge because of an absence of such experience. In particular, the experience data presented assumes a close coupling between nuclear safety, administrative control, and reactor systems performance." Order from the Clearinghouse HN-180, HC only, $6.75; A STUDY OF RESEARCH REACTOR OPERATING AND SAFETY EXPERIENCE.

Plastics

SYNTHESIS OF ELASTOMERS WITH SI-N BONDS

Linear polymers containing alternating silicon and nitrogen atoms have been prepared by Midwest Research Institute researchers via the aminosilyl derivatives of diazasilacyclopentane compounds. The Army-sponsored researchers also prepared high molecular weight polymers with elastomeric properties by condensation reactions of cyclosilazanes or cyclosiloxazanes with organic diols. Synthesis of N-substituted cyclosilazane and cyclosiloxazane monomers is possible with new methods developed. Monomers of the following class were prepared as precursors of potentially useful silazane polymers: silylpiperazines, p-phenylene-bis(dialkylsilylamines), and N-silylated cyclosilazanes. Silazane linkages inhibit peroxide-catalyzed polymerization of unsaturated silicon-substituted groups. Order from the Clearinghouse AD-614 473, HC $3.00/MF 75 cents; SYNTHESIS OF ELASTOMERS CONTAINING SI-N BONDS IN THE MAIN CHAIN.

Power Source Devices

HIGH-ENERGY DENSITY SECONDARY BATTERIES

A lithium-silver chloride-nonaqueous electrolyte cell system is "most promising for low rate, long life operations," according to a Lockheed study sponsored by the Air Force. In work leading to the development of high-energy density, secondary batteries, electrochemists say that for a propylene carbonate $LiAlCl_4$ system, the criteria of good electrochemical reversibility and high insolubility in electrolytes are met only by the silver-silver chloride electrode system. Other metal chloride systems under study formed soluble species or were electrochemically irreversible to some degree. The researchers did find the lithium metal anode to be compatible with the $LiAlCl_4$-PC system, showing excellent electrochemical reversibility. The electro-deposited lithium, however, was produced as a fine particulate, poorly adherent mass at room temperature, a form not suited for charge-discharge operation of a secondary battery. The best silver chloride electrodes were prepared by pasting a mix of 90 percent AgCl with 10 percent acetylene black on silver expanded metal and drying at 120°C. Order from the Clearinghouse AD-612 189, HC $4.00/MF 75 cents; LITHIUM-SILVER-CHLORIDE SECONDARY BATTERY INVESTIGATION.

Semiconductors and Related Materials

UNIPOLAR TRANSISTORS FOR INTEGRATED CIRCUITS

Both junction type and surface or MOS type unipolar transistors can be used in integrated circuits, Research Triangle Institute investigators conclude in an Air Force-sponsored study. The devices are not used to any great extent in such circuits at present, but with the development of the MOS field effect transistor and with the entry of integrated circuits into the linear circuit field, the researchers predict there should soon be a significant increase in their use. The high gate input impedance of field effect devices is a distinct advantage over bipolar transistors in many linear circuits, especially in integrated circuits, because large coupling capacitors are very difficult to obtain. In addition to linear circuits, the surface field effect transistors appear to be very promising active devices for low power logic circuits. They are readily adaptable to large arrays of logic elements, and they may become among the most important components of future integrated circuits. Order from the Clearinghouse AD-613 951, HC $6.00/MF $1.50; INTEGRATED SILICON DEVICE TECHNOLOGY. VOLUME VI. UNIPOLAR TRANSISTORS.

The abundance of R&D reports available creates a problem for industry in extracting those most likely to prove of value--for technical solutions and in keeping up with new developments. These Clearinghouse tools and services, and others planned, are designed to narrow the search.

PINPOINTING R&D REPORTS

Selection Aids For Industry

▶ GOVERNMENT-WIDE INDEX appearing monthly is a single reference guide to Government-sponsored research and development announced in four of the major technical announcement journals of the Federal Government: USGRDR, Technical Abstract Bulletin of the Defense Documentation Center, Nuclear Science Abstracts of the Atomic Energy Commission, and Scientific and Technical Aerospace Reports of the National Aeronautics and Space Administration. (Annual Subscription $10, $2.50 additional for foreign mailing, $1.25 single copy.) Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D. C., 20402.

▶ SELECTIVE BIBLIOGRAPHIES--from Abrasives to Zirconium--will be mailed free. A list of more than 200 available from the Clearinghouse will be mailed on request. Here is a sample list of ten:

SB-441 Materials Testing
SB-444 Electronic Miniaturization
SB-480 Textile Fibers
SB-515 Paper
SB-518 Paints and Varnishes
SB-523 Batteries
SB-524 Expanded Plastics
SB-526 Metal Composites
SB-529 Hydrofoil Boats
SB-541 Fluid Amplifiers

▶ LITERATURE SEARCHING SERVICE provides two kinds of bibliographies:

a) Current Awareness on selected fields of interest on a periodic basis.
b) Retrospective, listing the literature available to date.

These searches are made to order using the combined facilities of the Clearinghouse, the Science and Technology Division of the Library of Congress and the science collections of the Departments of the Interior and Agriculture, or any combination of these facilities at $11 an hour (8 hours minimum searching time).

▶ FAST ANNOUNCEMENT SERVICE reviews reports of special industrial significance. Announcements are classified and mailed by industrial category. No charge.

▶ RESEARCH REVIEWS at 50 cents a copy are packaged summaries, abstracts and bibliographies gathered under the following titles (other titles are in progress):

OTR-101 Hot Machining
OTR-102 Nickel-Titanium Alloys
OTR-103 Photochromism and Phototropism
OTR-104 Fire Extinguishing Material Technology
OTR-105 Flame-Retardant Textiles
OTR-106 Humidity Controlled Warehousing
OTR-107 Concrete Technology
OTR-108 Volatile Corrosion Inhibitors
OTR-109 Grease Lubrication
OTR-110 Thermoelectric Materials and Fabrication
OTR-111 Integrated Circuitry
OTR-112 Fluid Amplification
OTR-113 Ultrasonic Welding
OTR-114 Ultrasonic Testing
OTR-115 High Energy Metal Forming
OTR-116 Numerical Controls
OTR-117 Dielectric Films in Microelectronics
OTR-118 Fiber Optics

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Section II OTHER RESEARCH REPORTS AND RELATED MATERIAL from Page S-1 to S-49 (Printed on blue paper). Announces reports released by AEC, NASA and other civilian agencies and also certain older military reports. Included are AEC's Engineering (CAPE) Drawings, Government-Owned Patents and Privately-Owned Patents in the area of Lubricants.

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TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-614 582 Div. 1
CFSTI Prices: HC$3.00 MF$0.75

Aviation Safety Engineering and Research, Phoenix, Ariz.
CRASHWORTHINESS EVALUATION OF AN ENERGY-ABSORPTION EXPERIMENTAL TROOP SEAT CONCEPT.
Final technical rept.,
by Langston W. T. Weinberg. Feb 65, 80p
AvSER-64-11
Contract DA44 177AMC116T,
Task 1A024701A12101
TRECOM TR-65-6

Unclassified report

Descriptors: (*Aviation safety, Aircraft seats), (*Aircraft seats, Aviation safety), (*Helicopters, Aircraft seats), Safety harness, Accelerometers, Tensiometers, Tests, Design.

This report is an evaluation of an experimental troop seat concept that was progressively developed and dynamically tested. The seats were installed and tested along with other equipment in four full-scale crashes of CH-21 helicopters. The designs submitted represented progressive steps in the development of a troop seat using strut-type energy attenuation. The basic concept was a single-passenger, side-facing, bucket seat. Anthropomorphic dummies, restrained by lap belts and single diagonal chest straps, were placed in the seats to provide simulated human loading characteristics during impact. Accelerometers were mounted in the pelvic cavity of the dummies to permit recording of the impact decelerations. Floor accelerations were also measured near the seat installations. Tensiometers recorded the belt forces. High-speed cameras positioned in the helicopters recorded the reaction of the dummies and experimental seats during the crash sequences. The seats were divided into two basic functional units: first, a seat base incorporating an energy-absorbing strut to provide the vertical support; and second, a curved nylon seat back that was designed to provide the occupant with restraint in the lateral and longitudinal directions, in addition to the restraint provided by the lap belt and chest strap. The test series demonstrated the effectiveness of strut-type energy absorption as a method of attenuating crash forces. (Author)

AD-614 609 Div. 1, 15
CFSTI Prices: HC$1.00 MF$0.50

Litton Systems, Inc., St. Paul, Minn. Applied Science Div.
DETERMINATION OF THE SHAPE OF A FREE BALLOON: CYLINDER BALLOONS,
by Justin H. Smalley. 20 Nov 64, 20p
Scientific rept. no. SR-5, 2665
Contract AF19 628 2783, Proj. 6665, Task 666501
AFCRL 65-156

Unclassified report

Descriptors: (*Balloons, Cylindrical bodies), Stresses, Pressure, Configuration, Inflatable structures, Aerodynamic loading, Aerodynamic characteristics, Numerical methods and procedures.

Numerical design data are presented for purely cylinder balloons for sigma from zero to nearly 0.4. Meridional stresses also are given. Only zero superpressure is considered. In addition, some data are presented which give an insight into the method of solution for the tangent-harness type of balloon. (Author)

AD-614 610 Div. 1, 15

Litton Systems, Inc., Minneapolis, Minn. Applied Science Div.
DETERMINATION OF THE SHAPE OF A FREE BALLOON, SUMMARY.
Final rept. for 1 Mar 64-15 Feb 65,
by Justin H. Smalley. 5 Feb 65, 77p
Rept. no. 2713
Contract AF19 628 2783, Proj. 6665, Task 666501
AFCRL 65-92

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Balloons, Geometrical forms), Stresses, Tables, Pressure, Configuration, Inflatable structures, Aerodynamic loading, Aerodynamic characteristics, Cylindrical bodies, Programming languages.

The major findings of the study are summarized. Differential equations for the shape, stresses, area, and volume of fully tailored, cylinder, cylinder-end, and taper-tangent balloon designs are given. Design data are presented for fully tailored and cylinder balloons. The accuracy of the data is shown to be well within the requirements for balloon design. Recommendations for further work are included. (Author)

AD-614 622 Div. 1, 6
CFSTI Prices: HC$4.00 MF$0.75

Sperry Gyroscope Co., Great Neck, N. Y.
A STUDY OF REQUIREMENTS FOR A PILOT WARNING INSTRUMENT FOR VISUAL AIRBORNE COLLISION AVOIDANCE.
Final rept.,
by J. Catalano and C. McKown. Dec 63, 106p
Rept. no. EB-5260-0390
Contract FAA BRD322, Proj. 110 504
SRDS RD-64-88

Unclassified report

Descriptors: (*Flight instruments, Aviation safety), (*Aviation safety, Flight instruments), (*Aviation accidents, Airborne), Pilots, Visual signals, Flight simulators, Effectiveness, Aircraft, Maneuverability, Probability.

The utility of information which would be provided by operational Pilot Warning Instruments (PWI) was studied experimentally in terms of the effect of PWI upon each stage of pilot activity occurring when a pilot is confronted by an intruder, viz., detection of the intruder, evaluation of the intruder threat, and the resulting avoidance maneuver. It was found that PWI improved the probability of detecting intruder aircraft. The extent of improvement was directly

related to the amount of the information it provided. In addition, earlier detection, as would occur from PWI information, resulted in earlier evaluation of intruder threat and in earlier maneuvering, when necessary. Effectiveness in the operational situation would, of course, also depend upon such factors as closing rate and angle, range at detection, and aircraft maneuverability. (Author)

AD-614 625 Div. 1
CFSTI Prices: HC$2.00 MF$0.50

Litton Systems, Inc., St. Paul, Minn. Applied Sciences Div.
DETERMINATION OF THE SHAPE OF A FREE BALLOON. CONSIDERATION OF MATERIAL ELASTICITY,
by Justin H. Smalley. 3 Dec 64, 33p
Scientific rept. no. SR-6, 2704
Contract AF19 628 2783, Proj. 6665, Task 666501
AFCRL 65-157
Unclassified report

Descriptors: (*Balloons, Geometrical forms), (*Elasticity, Balloons), Stresses, Pressure, Configuration, Inflatable structures, Aerodynamic loading, Aerodynamic characteristics, Deformation, Polyethylene plastics, Membranes.

Linear membrane theory is used to determine the effect of material elasticity on the stresses and shape of a free balloon which is originally inelastic. Two cases are considered: a zero superpressure natural-shape polyethylene balloon of taper-tangent design, and a superpressure Mylar balloon of tangent-harness design. Deformations and stress changes are small in both balloons, except that at the top of the natural-shape balloon, linear membrane theory does not apply and stress changes and deformations are not determined. Reference is made to a non-linear membrane theory which can be used to determine these parameters. (Author)

AD-614 653 Div. 1, 25
CFSTI Prices: HC$3.00 MF$0.75

Illinois Univ., Urbana. Dept. of Aeronautical and Astronautical Engineering.
FREE VIBRATION OF CONTINUOUS SKIN-STRINGER PANELS WITH NON-UNIFORM STRINGER SPACING AND PANEL THICKNESS.
Summary rept. for Jun 63-Sep 64,
by Y. K. Lin, T. J. McDaniel, B. K. Donaldson, C. F. Vail, and W. J. Dwyer. Feb 65, 58p
Contract AF33 657 11715, Proj. 7351, Task 735106
ML TR-64-347 P1
Unclassified report

Descriptors: (*Airplane panels, Vibration), Elasticity, Moment of inertia, Matrix algebra.

The method of transfer matrices is employed to obtain the natural frequencies and mode shapes of an array of skin panels which are continuous over supporting stringers. The stringer spacing may be non-uniform and individual panels and stringers may vary from panel to panel. Donnell's equations for cylindrical shells are used in the analysis of curved panel systems. Numerical results are given for systems of three flat panels and of six flat panels. (Author)

AD-614 828 Div. 1, 28

Bunker-Ramo Corp., Canoga Park, Calif.
HUMAN ENGINEERING FOR CONTROL-DISPLAY.
Final rept. for 21 Feb 64-15 Mar 65,
by C. A. Gainer. Mar 65, 148p Rept. no. 2-64
Contract AF33 657 8600, Proj. 6190, Task 619007
Unclassified report
Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Human engineering, Aircraft), (*Display systems, Human engineering), Control systems, Flight instruments, Cockpits, Visual perception, Navigation.

The report is a final summary report on a variety of studies related to human engineering for control-display systems for aircraft.

AD-614 914 Div. 1, 2
CFSTI Prices: HC$3.00 MF$0.75

Little (Authur D.) Inc., Cambridge, Mass.
ELECTRICAL BEHAVIOR OF AN AIRPLANE IN A THUNDERSTORM.
Technical rept.,
by Bernard Vonnegut. Feb 65, 65p
Contract FA64WA5151, Proj. 321 020 01H
FAA ADS 36
Unclassified report

Descriptors: (*Aircraft, Thunderstorms), (*Thunderstorms, Aircraft), Aviation safety, Lightning, Electric discharges, Electrical properties, Electrostatics, Electrostatic fields, Static electricity, Cumulonimbus clouds.

By processes as yet poorly understood, extensive regions of both positive and negative electric charge form in large convective clouds. These clouds are the primary source of the lightning discharges that sometimes strike airplanes. Airplanes in flight can develop electrical charges on their surface as the result of a variety of processes but the maximum amount of charge that they can carry is limited by point discharge and is negligibly small compared to the charge transferred by a lightning discharge. Although the amounts of net or induced charge on the airplane are small compared to the amount of charge in the thundercloud, these charges can locally cause an appreciable intensification of the electric field of a thunderstorm. While some lightning discharges to airplanes may be attributable to chance alone, there are reasons to believe that the electric charges on the airplane may either attract or initiate lightning discharges. It does not appear to be feasible to produce a significant reduction in the probability of an airplane receiving a lightning discharge by any technique for controlling the charge on the airplane. The most promising solution to the hazards posed by lightning is to design airplanes so that they are capable of receiving discharges without damage. (Author)

AD-615 031 Div. 1, 31
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
PRELIMINARY RESULTS OF WIND-TUNNEL TESTS OF THE HS-2 HYDROSKIMMER.
Preliminary rept.,
by William H. Dunham. Oct 61, 36p
Rept. no. 1571 Unclassified report

Descriptors: (*Ground effect machines, Tests), Hulls (Marine), Configuration, Lift, Airfoils, Aerodynamic control surfaces, Boundary layer control, Models (Simulations), Performance (Engineering), Wind tunnels.

Investigations were made in a wind tunnel to determine a hull configuration for augmenting the lift and improving the overall performance of a ground effect machine (GEM). The aerodynamic properties of a thick airfoil section with boundary-layer control and different geometrical configurations for the craft were studied in preliminary tests. Parameters established in these tests were used to construct a model for testing in ground effect. Preliminary results and performance predictions for a GEM craft with lift augmentation are presented. (Author)

2. Astronomy, Geophysics and Geography

AD-614 614 Div. 2, 24, 30

Woods Hole Oceanographic Institution, Mass.
IMPROVEMENTS ON THE RONNE SYSTEM OF CLOUD MEASUREMENTS FROM AIRCRAFT MOTION PICTURE FILMS,
by Andrew F. Bunker. Mar 65, 21p
Technical rept. no. TR-1, Ref-65-17
Grant NSF G22389

Unclassified report

Unpublished manuscript.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Cloud height indicators, Aerial photography), (*Motion picture photography, Aerial photography), (*Aerial photography, Cloud height indicators), Clouds, Height finding, Distance-measuring equipment, Aircraft, Motion picture cameras, Motion picture films, Programming (Computers), Meteorological instruments.

In 1959 Ronne developed a system of measuring film taken by a time-lapsed motion picture camera mounted in an aircraft so that cloud heights and distances could be computed. The measurement system has been redesigned and a Fortran program has been written for the computation of distances and heights. Utilizing the phenomenon that the bases of cumulus clouds in a given air mass have nearly the same height, a method of determining the level line when the horizon is obscured by haze or clouds has been devised and incorporated into the program. (Author)

AD-614 620 Div. 2, 8

Kiruna Geophysical Observatory (Sweden).
ON THE AMPLIFICATION OF ELF EMISSIONS BY CHARGED PARTICLES IN THE EXOSPHERE, WITH SPECIAL REFERENCE TO THE FREQUENCY BAND AROUND THE PROTON CYCLOTRON FREQUENCY,
by Bengt Hultqvist. Jan 65, 17p
Scientific rept. no. SR-2
Contract AF61 052 619
AFCRL 65-166

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Cyclotron waves, Exosphere), (*Atmospherics, Extremely low frequency), (*Exosphere, Cyclotron waves), Electromagnetic waves, Propagation, Plasma medium, Models (Simulations), Protons.

Using a collisionless warm-plasma model having different temperatures along and perpendicular to the geomagnetic field, and a macroscopic drift along the field lines, possible amplification and absorption mechanisms for transverse waves propagating along the field lines were investigated with particular regard to frequencies near the proton cyclotron frequency. A search was made, notably, for frequency-selective effects that might account for the observations, in high latitudes, of narrow band emissions centered at approximately 700 cps, which is close to the proton cyclotron frequency in the ionosphere. No such effects were found. The only ELF emissions which readily may be amplified in the exosphere are those of right-handed polarisation. Streaming protons may cause the amplification. ELF emissions of left-handed polarization may be amplified by high-energy electrons. From the theory applied in this study, it follows that instabilities caused by anisotropic temperatures possibly are factors in the generation of L-mode emissions at frequencies below the proton cyclotron frequency, in which case the protons will constitute the important factor.

AD-614 646 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

McGill Univ., Montreal (Quebec).
THE HEAT BUDGET OVER THE ARCTIC OCEAN.
Final rept. for Sep 61-Jan 65,
by Eberhard Vowinckel and Svenn Orvig. Feb 65, 44p
Publication in Met. no. PM-74
Contract AF19 604 7415, Projs. 7628, 8623,
Tasks 762804, 862303
AFCRL 65-230

Unclassified report

Descriptors: (*Arctic Ocean, Heat transfer), (*Heat transfer, Arctic Ocean), (*Marine meteorology, Arctic Ocean), Atmospheric temperature, Climatology, Troposphere, Graphics, Tables, Oceanology.

The aim of the studies was to assess, from average data, the magnitudes of the various terms in the heat budget of the surface and atmosphere of the Arctic. Also, is possible, to consider effects of variations in these terms. The method used was to examine each term in the energy balance equation in turn, and to calculate for grid points monthly mean values of the various processes. The investigation was not undertaken for oceanographic purposes but for heat balance calculations. Therefore, all the more detailed oceanographic material was disregarded, such as different water masses and stratification. Mas flux and temperatures for the various ocean currents into and out of the Arctic were examined. Runoff and precipitation were also studied. Ice export by the various currents was treated, and the heat gain by formation and export of sea ice was calculated. Finally, water balance and heat flux estimates were obtained for the Arctic and Polar Oceans, with the annual total heat gain, including that of ice.

AD-614 658 Div. 2, 8

McGill Univ., Montreal (Quebec). Stormy Weather Group.
INTERPRETATION OF THE FLUCTUATING ECHO FROM RANDOMLY DISTRIBUTED SCATTERS: PART 3,
by Paul L. Smith, Jr. Dec 64, 78p
Scientific rept. no. SR-1, MW-39
Contract AF19 628 2489, Proj. 6672, Task 667205
AFCRL 64-1006

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Meteorological radar, Radar echo areas), (*Radar echo areas, Meteorological radar), Atmospheric precipitation, Radar reflectors, Radar reflections, Intensity, Probability, Distribution, Statistical analysis.

The interpretation of the fluctuating echo is an important problem in radar meteorology. The problem is usually to estimate the long-term mean echo intensity by examining only a rather small number of echoes. This 'observer's problem' is the principal subject of the present report. The solution to the observer's problem is obtained as a probability distribution of the long-term mean echo intensity. This distribution becomes narrower and more sharply peaked as the number of independent echoes measured increases. The exact form of the distribution depends on the assumed a priori probability distribution; however, the dependence becomes negligible when the number of echoes is sufficiently large. Averaging the echo intensities is the optimum method of processing the echoes; averaging intensity levels or amplitudes is less satisfactory. However, the loss of precision when intensity levels are averaged is small, and it may be offset by other advantages of the logarithmic scale. Measuring only the intensity level of the maximum echo gives better results than averaging when the number of echoes is small, and somewhat poorer results when the number is large. (Author)

AD-614 667 Div. 2, 6, 19
CFSTI Prices: HC$3.00 MF$0.75

Ohio State Univ., Columbus.
A FIELD EVALUATION OF THE KERN DKM3-A ASTRONOMICAL THEODOLITE FOR PRECISE ASTRONOMIC POSITION DETERMINATION.
Master's thesis,
by William Eugene Carter. 1965, 62p
Unclassified report

Descriptors: (*Theodolites, Astronomical geodesics), (*Astronomical geodesics, Theodolites), (*Geodesics, Determination), Optical tracking, Optical equipment, Telescopes, Micrometers, Calibration.

The DKM3-A is a variant of the Double Circle Triangulation Theodolite DKM3, the principal changes being those necessary to facilitate the addition of an astronomic micrometer accuracy: The results indicate that the DKM3-A is capable of producing first-order latitude and longitude determinations as defined in the thesis. FIELD CHARACTERISTICS: The DKM3-A is an excellent field instrument from the viewpoints of portability, versatility, and observer convenience. The DKM-3 has already proven that the basic mechanical and optical components are sound, and it is likely that the DKM3-A will prove adequate in these respects also. The additions of the astronomic micrometer, weighted striding level, and double Horrebow level add considerably to the weight that the vertical axis system must support, and its effect on the life of the system could prove significant. The DKM3-A appears to have all the necessary ingredients to make it a valuable addition to the geodesists' array of tools.

AD-614 668 Div. 2, 30
CFSTI Prices: HC$3.00 MF$0.75

Ohio State Univ., Columbus.
SQUARE METHOD FOR DETERMINING THE TERRAIN CORRECTION, USING A DIGITAL COMPUTER.
Master's thesis,
by Larry Delano Beers. 1965, 76p
Unclassified report

Descriptors: (*Terrain, Corrections), (*Programming (Computers), Geodesics), (*Geodesics, Programming (Computers)), Gravity, Reduction, Mountains, Nevada, Colorado.

AD-614 670 Div. 2, 8
CFSTI Prices: HC$2.00 MF$0.50

Ionospharen-Institut, Breisach (West Germany).
STATISTICS OF E-REGION DRIFT AT PUERTO RICO REDUCED BY THE 'SIMILAR FADE' METHOD.
Annual summary rept. for 1963-1964,
by E. Harnischmacher. 15 Nov 64, 50p
Rept. no. IIB-13
Contract AF61 052 672
AFCRL 65-245
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Atmospheric sounding, Electromagnetic wave reflections), (*Electromagnetic wave reflections, Atmospheric sounding), (*Ionosphere, Atmospheric sounding), Electron density, Drift, Puerto Rico, Statistical analysis, Graphics.

Three antennae records of E-region echoes obtained at the University of Puerto Rico in 1954 . . . 57 have been evaluated by Harnischmacher's tabulation method. This is a 'similar fade' method insofar as the drift is found from the time differences between corresponding fades on the three traces. However, these time differences are only read with a limited number of steps as entire multiples of a minimum difference, viz. 1/10 sec. The corresponding apparent drift direction and velocity are easily read from a table. As only that drift component is so found which is perpendicular to the 'fading crests', individual determinations are not considered to be significant at all. Median values of drift direction and velocity from about a dozen individual fades taken out of a period of 5 to 10 min are used as entries for the statistics presented in this report.

AD-614 679 Div. 2, 8
CFSTI Prices: HC$3.00 MF$0.75

Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
AN INVESTIGATION OF THE APPLICABILITY OF ANALYTICALLY MANAGEABLE RAINDROP SIZE DISTRIBUTIONS TO RADAR OBSERVATIONS OF SUBTROPICAL PRECIPITATION.
Master's thesis,
by Robert Wayne Fanning. May 65, 64p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Meteorological radar, Radar echo areas), (*Radar echo areas, Raindrops), (*Raindrops, Radar echo areas), Particle size, Statistical functions, Meteorology, Atmospheric precipitation, Radar reflections, Feasibility studies.

The feasibility of representing drop-size distributions of subtropical precipitation by exponentially-damped functions is investigated. Distribution functions are proposed which are found to reproduce the actual drop-size distributions investigated better than the Marshall-Palmer distribution. The proposed drop-size distribution functions are applied to the equations for a dual-frequency radar system. It is shown that it is possible to describe completely the drop-size distribution in a precipitation volume by use of graphical relations derived in the investigation coupled with power measurements in a

dual-frequency system which exploits the greater attenuation at 3.2-cm over that at 10.3-cm wave lengths. The development presumes that the drop-size distribution in the radar echo volume can be represented adequately by one of the functions investigated.

AD-614 680 Div. 2, 24
CFSTI Prices: HC$3.00 MF$0.75

Manchester Univ. (England). Dept. of Astronomy.
TURBULENCE AND RESOLUTION IN ASTRONOMICAL PHOTOGRAPHY,
by Roger F. Edgar. Jan 64, 72p
Technical note no. TN-4
Contract AF61 052 496
Unclassified report

Descriptors: (*Astronomy, Photographic images), (*Photographic images, Resolution), (*Atmospheric motion, Turbulence), (*Resolution, Turbulence), Refractive index, Optical properties, Photographic grain, Photographic emulsion.

A method is outlined of studying, individually and collectively, all the effects which influence the resolution of an astronomical telescope used to photograph celestial objects. A method of optimising the resolution is considered. (Author)

AD-614 706 Div. 2

Marine Lab., Univ. of Miami, Coral Gables, Fla.
MESOSCALE STUDIES OF INSTABILITY PATTERNS AND WINDS IN THE TROPICS.
Semi-annual rept. no. 3, 1 Jun-30 Nov 64,
by Harold P. Gerrish and Homer W. Hiser. Feb 65,
69p Rept. no. 7, ML-65102
Contract DA36 039sc89111, Proj. 1V0 14501B53A09
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Meteorology, Tropical regions), (*Meteorological radar, Air mass analysis), (*Wind, Tropical regions), Florida, Weather forecasting, Rainfall, Radar reflections, Radar echo areas.

Iso-echo contoured CAPPI radar data collected manually on 16 July and 28 September, and non-contoured CAPPI data on 1 October 1964 are used to investigate the motions of individual tropical showers at 'altitudes' of 10,000, 20,000, and 30,000 ft. The motions at these 'altitudes' are tested as possible indicators of wind. Echo-motion shear between 'altitudes' is used to illustrate mechanisms by which the showers grow under baroclinic conditions. Vertical profiles of radar reflectivity and precipitation rate from the showers are examined. Reflectivity equations and nomograms for the MPS-4, modified CPS-6B, and WSR-57 radars are presented. The relationship Z=300R exp 1.4 is used to relate radar reflectivity to tropical rainfall rates. The attenuation problem at a wavelength of 4.7 cm is described and illustrated. (Author)

AD-614 715 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Chicago Univ., Ill.
THEORETICAL INVESTIGATIONS OF THE EXPANSION OF H II REGIONS.
Final rept. for 1 Oct 63-31 Dec 64,
by Peter O. Vandervoort. 12 Apr 65, 9p
Grant Nonr G00025 64, Proj. NR046 794
Unclassified report

Descriptors: (*Gas ionization, Nebulae), (*Interstellar matter, Gas ionization), (*Nebulae, Gas ionization), Astrophysics, Hydrogen, Excitation, Stars, Light, Models (Simulations), Theory, Fluid mechanics.

The essential phenomenon is the ionization of hydrogen in the interstellar gas by the radiation emitted in the Lyman continuum by a newly formed star of early spectral type. As the gas is ionized it is heated as well. The volume of ionized gas (the H II region) tends to expand, generating a compression wave moving out through the surrounding neutral interstellar gas (the H I region). The general objective of research in this area has been the construction of theoretical models of the manner in which the gas becomes ionized in an H II region and of the gas-dynamical response of both the neutral gas and the ionized gas to the ionization and heating of the gas.

AD-614 716 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Iowa State Univ., Iowa City.
METHOD OF DETERMINING ALPHA = n(H+)/ n SUB e AND THE ION TEMPERATURE FROM MEASUREMENT OF PROTON-WHISTLERS.
by Stanley D. Shawhan and Donald A. Gurnett.
Apr 65, 30p Rept. no. 65-9
Contract Nonr150906
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Whistlers, Protons), (*Protons, Whistlers), (*Electron density, Ionosphere), (*Ionosphere, Whistlers), Diurnal variations, Very low frequency, Oxygen, Helium, Ions, Temperature.

A statement is made of the theory and of the formulas used to derive the concentration of H(+) ion relative to the electron concentration and the ion temperature from the measurement of proton-whistlers. The potential results are discussed of measuring proton-whistlers from all of the Injun III VLF data based on a preliminary study of local summer day and winter night. Other measurements are suggested that can be made on VLF data to obtain the concentrations of He(+) and O(+) relative to the electron density.

AD-614 720 Div. 2

Scripps Institution of Oceanography, Univ. of California, La Jolla.
VOLCANISM AND CLAY MINERALS IN THE SOUTHEASTERN PACIFIC,
by M. N. A. Peterson and J. J. Griffin. 1963, 10p
Contract Nonr221623; Grant NSF GP489,
Proj. NR083 005
Unclassified report

Pub. in Journal of Marine Research v22 n1 p13-21 Jan 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pacific Ocean, Sedimentation), (*Clay minerals, Pacific Ocean), (*Volcanoes, Sedimentation), (*Sedimentation, Pacific Ocean), Feldspar, Quartz, Montmorillonite, Chlorites, Distribution, Oceanology.

The distribution of clay mineral suites in surficial sediments of the southeastern Pacific is clearly related to variations in the composition of volcanic contributions to the sediments. The ratio of alkali feldspar plus quartz to plagioclase has been used to characterize the volcanic contributions. Sediments in areas of dominantly acidic volcanism contain clay mineral suites that are largely of detrital origin, mainly 'illite' and chlorite. Clay minerals containing abundant montmorillonite characterize areas of dominantly basaltic volcanism. The montmorillonite develops from the basic volcanic glassy debris very shortly after deposition. (Author)

AD-614 721 Div. 2, 25

Air Force Cambridge Research Labs., Bedford, Mass.
COUPLING OF MAGNETOHYDRODYNAMIC WAVES IN STRATIFIED MEDIA.
Environmental Research Papers,
by H. Poeverlein. 23 Jul 64, 15p
Paper no. ERP-91, AFCRL 65-175
Proj. 5631, Task 563110

Unclassified report

Pub. in Physical Review v136 n6A pA1605-13 Dec 14 1964. (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 10 Apr 64.

Descriptors: (*Magnetohydrodynamics, Acoustics), (*Plasma oscillations, Propagation), (*Upper atmosphere, Magnetohydrodynamics), Magnetic fields, Vector analysis, Matrix algebra, Ionosphere.

The theory presented deals with propagation of magnetohydrodynamic waves in a plasma whose propagation characteristics vary along the path of propagation. Plane waves with wave normals in the direction of the gradient of the medium are assumed. Modified Alfven waves and acoustic waves obey a set of coupled wave equations. Alfven waves are decoupled by a restricting assumption on the variation of the static magnetic field. The main aim of the paper is to demonstrate the generation of fairly intense acoustic waves in propagation of modified Alfven waves in a steep gradient of the propagation conditions. This effect is investigated at a boundary which is equivalent to a very steep gradient. (Author)

AD-614 723 Div. 2

Air Force Cambridge Research Labs., Bedford, Mass.
AIRFLOW AND PRECIPITATION TRAJECTORIES WITHIN SEVERE LOCAL STORMS WHICH TRAVEL TO THE RIGHT OF THE WINDS.
Environmental Research Papers,
by Keith A. Browning. 9 Jul 64, 13p
Paper no. ERP-93, AFCRL 65-218
Proj. 6672, Task 667203

Unclassified report

Pub. in Journal of Atmospheric Sciences v21 n6 p634-9 Nov 1964 (Copies not available to DDC or Clearinghouse customers).
Revision of manuscript submitted 5 May 64.

Descriptors: (*Storms, Air mass analysis), (*Air mass analysis, Storms), Winds, Models (Simulations), Meteorological radar, Radar echo areas, Meteorology, Atmospheric precipitation.

A kinematic airflow model is proposed for severe local storms which travel to the right of the winds in the middle troposphere. The model is an extension of that proposed by Browning and Ludlam (1962), and represents an open system in which an updraft and a precipitation-maintained downdraft are fed persistently by air approaching the storm from its right flank. A qualitative consideration of precipitation trajectories enables the principal features of the radar structure of many severe local storms to be explained. (Author)

AD-614 726 Div. 2

Marine Physical Lab., Univ. of California, San Diego.
T PHASES FROM 80 ALASKAN EARTHQUAKES, MARCH 28-31, 1964,
by John Northrop. 16 Sep 64, 6p
Rept. no. MPL-U-39/64
Contract Nonr221605

Unclassified report

Pub. in Seismological Society of America. Bulletin v55 n1 p59-63 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Marine geophysics, Seismology), (*Seismology, Marine geophysics), (*Earthquakes, Alaska), Seismic waves.

A large T-phase signal was received at Pt. Sur, California, from the Alaskan earthquake of March 28, 1964. Additional T phases were received from hypocenters beneath the upper portion of the continental shelf. (Author)

AD-614 727 Div. 2

Marine Physical Lab., Univ. of California, San Diego.
SEISMIC WAVES RECORDED IN THE NORTH PACIFIC FROM FLIP.
Revised ed.,
by John Northrop and Rockne H. Johnson. 13 Oct 64, 9p Rept. no. MPL-U-63/63
Contract Nonr221605

Unclassified report

Pub. in Journal of Geophysical Research v70 n2 p311-8 Jan 15 1965 (Copies not available to DDC or Clearinghouse customers)
Revision of manuscript submitted 1 Aug 64.
Prepared in cooperation with Hawaii Inst. of Geophysics, Honolulu, Contract Nonr374801.

Descriptors: (*Seismic waves, Marine geophysics), (*Marine geophysics, Seismic waves), Earthquakes, Underwater explosions, Identification systems, Seismology, Underwater sound equipment, Floating bodies, Pacific Ocean.

During September 1963, an experimental program of oceanographic observations was conducted 2200 km northeast of Hawaii (39 degrees N, 148 degrees W). One of the programs attempted was monitoring of hydroacoustic signals with hydrophones suspended from floats attached to Flip, a floating instrument platform. By comparing the arrival times of these events with those recorded on Sofar-type hydrophones of the Pacific missile range network and at Point Sur, California, epicenters were established for 22 transients. Of these, two were identified as earthquake T phases, two as acoustic arrivals from known underwater shots near the Aleutians, and 18 from underwater shots of unknown origin off Hokkaido, Japan. All the events came from the margins of the Pacific Ocean basin. No seaquakes from the Mendocino escarpment were recorded. (Author)

AD-614 742 Div. 2

Florida Univ., Gainesville.
DECAMETER-WAVELENGTH OBSERVATIONS OF JUPITER: THE APPARITIONS OF 1961 AND 1962. Revised ed.,
by Alex G. Smith, G. R. Lebo, N. F. Six, Jr., T. D. Carr, and Heins Bollhagen. 12 Oct 64, 22p
Unclassified report

Pub. in Astrophysical Journal v141 n2 p457-7 Feb 15 1965. (Copies not available to DDC or Clearinghouse customers)
Revision of manuscript submitted 10 Aug 64.

Descriptors: (*Jupiter, Radio astronomy), (*Radio astronomy, Jupiter), High frequency, Extraterrestrial radio waves, Electronic recording systems, Astronomical data, Graphics, Astrophysics.

A final reduction has been made of extensive observations of Jupiter conducted during 1961 and 1962 in the radio-frequency range 5-31 Mc/s. Both probability-of-emission and intensity studies have been made of the several decametric 'sources.' It appears that a change in the apparent rate of rotation of the sources occurred in 1960. Both the over-all Jovian activity and the apparent widths of the sources have increased as the solar cycle declined, although the gross source geometry remains much the same as in previous years. Television techniques have been used in a search for optical activity correlated with the Jovian outbursts. Venus and Mars have shown no detectable decametric activity, while Saturn remains, as before, a dubious source. (Author)

AD-614 745 Div. 2

Mackay School of Mines, Univ. of Nevada, Reno.
COMPUTER PROGRAM FOR AUTOMATIC PROCESSING OF BASIN AND RANGE SEISMIC DATA,
by Alan Ryall and Austin E. Jones. 17 Sep 64, 16p
Grant AF AFOSR646 64
Unclassified report

Pub. in Bulletin of the Seismological Society of America v54 n6 ptB p2295-2310 Dec 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Programming (Computers), Seismology), (*Seismology, Data processing systems), (*Data processing systems, Seismology), Digital computers, Universities, Nevada, Geophysics, Structural geology, Seismological stations.

A program was written for the University of Nevada's IBM 1620 computer which locates epicenters of seismic events that occur within the Nevada region. The program utilizes readings of P and S waves at up to eight stations in the Basin and Range province, rejects readings for events which are outside the region of interest or events recorded at less than three Nevada stations, establishes trial epicenters for locatable events by means of a table-lookup routine which utilized P-time differences between pairs of stations, and adjusts the trial epicenter by a least-squares procedure based on a sloping-layer crustal model derived from recent U. S. Geological Survey seismic refraction profiles. Epicenters calculated by the program are found to be affected by near-surface structural irregularities in the vicinity of receiving stations, but are not affected either by near-surface features in the source region or direction of the propagation paths with respect to regional structural trends. Traveltime delays calculated for Nevada seismographic stations appear to correlate with Bouguer gravity anomalies at the station sites. (Author)

AD-614 759 Div. 2, 30

Institute of Science and Tech., Univ. of Michigan, Ann Arbor.
DIFFRACTIVE PROCESSING OF GEOPHYSICAL DATA,
by Philip L. Jackson. 17 Nov 64, 10p
Unclassified report

Pub. in Applied Optics v4 n4 p419-27 Apr 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Geophysics, Data processing systems), (*Data processing systems, Optical equipment), (*Optical equipment, Data processing systems), Seismology, Data, Optical analysis, Diffraction gratings, Diffraction, Optical filters, Frequency analyzers, Integral transforms.

Processing of geophysical data can be accomplished by optical diffraction. The data are in the form of transmissive recordings, environmental photographs, or drawings. Five analyses can be performed at or near the Fraunhofer diffraction plane with single diffraction, three analyses through spatial filtering with double diffraction, and one (correlation) with triple diffraction. Primary emphasis is on the processing of variable-density seismograms, for which a special recorder has been constructed. Spatial filtering has also been applied to cloud cover pictures and contour maps. (Author)

AD-614 770 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONCERNING THE DETECTION OF WATER IN THE ATMOSPHERE OF VENUS,
by A. E. Salomonovich. 7 Apr 65, 17p
FTD-TT-65-296
TT 65-62090
Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Radiofizika (USSR) v7 n1 p51-8 1964.

Descriptors: (*Venus, Planetary atmospheres), (*Planetary atmospheres, Water vapor), (*Water vapor, Planetary atmospheres), Radio astronomy, Radiofrequency spectroscopy, Millimeter waves, Astrophysics, USSR.

The question of the nature of the cloud layer of Venus and the possibility of detecting water vapor in it's atmosphere is considered in the light of new data concerning the radiation spectrum of the dark side of the planet. (Author)

AD-614 780 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Minnesota Univ., Minneapolis.
QUANTITATIVE DATA FROM A PATTERNED GROUND SITE OVER PERMAFROST,
by John H. Schmertmann and R. Spence Taylor.
Feb 65, 86p
Contract DA11 190ENG13
CRREL RR-96
Unclassified report

Descriptors: (*Soil mechanics, Permafrost), (*Permafrost, Soil mechanics), Greenland, Soils, Terrain, Structural geology, Mapping, Correlation techniques, Geochemistry.

Techniques were established by which quantitative data can be obtained from patterned ground features. The field work was carried out during the summers of 1954 and 1955 near Camp Tuto, Greenland. The investigation site is described, and extensive data are presented. The soil materials composing the patterned ground features were found to be of common mineralogy, grain size distribution, and plasticity. The chemical nature of the soils does not contribute to feature formation; it is the mechanical processes acting on these materials that are important. A sharp rise in the soil water content in the form of ice was consistently noted when passing through the base of the active layer into the present permafrost. A new heave occurred at both feature center and border locations. The magnitude of the heave is about 0.05 ft for the centers and 0.03 ft for the borders. Feature age was estimated to be about 150 yr. Vertical sorting occurs over the entire depth of the active layer but radial sorting is confined to the upper 2 ft. Groundwater flow occurs mostly through the feature borders, and incoming radiation has an important effect on the progression of the frost line. The progression of thaw is very rapid and, by the end of summer, the thaw penetration is greatest under the feature centers. (Author)

AD-614 781 Div. 2, 13
CFSTI Prices: HC$1.00 MF$0.50

Miami Univ., Coral Gables, Fla.
CRITERIA FOR MEASUREMENT OF STRAIN RATES IN DEEP BORE HOLES IN POLAR GLACIERS,
by Henri Bader. Dec 64, 13p
Grant DA ENG27 021 62G2, Task 8X99 27 001 03
CRREL RR-127

Unclassified report

Descriptors: (*Glaciers, Well logging), (*Well logging, Glaciers), Polar regions, Greenland, Ice, Mechanical properties, Test methods, Drilling machines, Models (Simulations).

The different components of vertical strain rate are discussed, as well as their relation to horizontal strain rate. Based on a simplified model, strain rates as a function of depth below the surface are calculated for Camp Century, Greenland, and Byrd Station, Antarctica. The results indicate that only very high measurement accuracy is likely to yield useful results. Measurement of horizontal shear rate is also discussed. (Author)

AD-614 791 Div. 2
CFSTI Prices: HC$4.00 MF$1.00

Bermuda Biological Station, St. George's West.
PRIMARY PRODUCTIVITY IN THE TROPICAL NORTH ATLANTIC OFF BARBADOS AND THE CARIBBEAN SEA OFF JAMAICA: PRODUCTIVITY OF INSHORE WATERS OFF JAMAICA; PHYSICAL, CHEMICAL, AND BIOLOGICAL OBSERVATIONS IN THE TROPICAL NORTH ATLANTIC OFF BARBADOS AND THE CARIBBEAN SEA OFF JAMAICA.
Final rept.,
by John R. Beers, David M. Steven, John B. Lewis, and David W. Menzel. Mar 65, 134p
Contract Nonr113505

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Oceanology, West Indies), (*Atlantic Ocean, Oceanology), (*Caribbean Sea, Oceanology), Marine biology, Chemical properties, Physical properties, Tropical regions, Oceanographic data.

AD-614 814 Div. 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
MICROMETEOROLOGICAL PHENOMENA OF UNDERWATER NUCLEAR EXPLOSIONS,
by George A. Young. 14 Jan 65, 37p
Rept. no. NOLTR-64-187
Task FR70

Unclassified report

Presented at the National Conference on Micrometeorology at Salt Lake City, Utah on 14 Oct 64.

Descriptors: (*Micrometeorology, Nuclear explosions), (*Nuclear explosions, Micrometeorology), Marine meteorology, Underwater explosions, Explosion effects, Tropical regions, Radioactive fallout.

The above-surface phenomena of Test Baker in Operation Crossroads (1946) are described in detail with emphasis on the primary base surge. Some recent theoretical results concerning the surge structure and behavior are summarized. The base surge from the Teapot ESS Underground Test is briefly described and compared with the Baker surge. (Author)

AD-614 867 Div. 2, 25, 30

Acoustics and Seismics Lab., Univ. of Michigan, Ann Arbor.
ANALYSIS OF VARIABLE-DENSITY SEISMOGRAMS BY MEANS OF OPTICAL DIFFRACTION,
by Philip L. Jackson. 28 Apr 64, 20p
Contract AF49 638 1078

Unclassified report

Rept. presented at the Annual International Meeting of the SEG (33rd), New Orleans, La., 23 Oct 63.
Rept. on Proj. VELA-UNIFORM.
Pub. in Geophysics v30 n1 p5-23 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismology, Data processing systems), (*Data processing systems, Optical equipment), (*Optical equipment, Data processing systems), Optical scanning, Optical analysis, Diffraction gratings, Diffraction, Optical filters, Frequency analyzers, Integral transforms, Optics.

Variable-density seismograms were originally developed in exploration work to aid in the visualization of strata formations. They can also be directly analyzed by means of optical diffraction. When a plane wave of spatially coherent monochromatic light passes through a variable-density seismogram, a diffraction pattern can be formed which defines the seismic frequencies. The seismogram is placed so that it affects the incident light in the same manner as a diffraction grating in a conventional spectroscopic apparatus. Resulting diffraction patterns reveal continuous energy-density spectra over a range of about nine octaves. The spectra are normally two-dimensional. When variable-density profiles are used, the second dimension of the spectra is wavenumber, which is expressed as the diffraction caused by density variations across the data channels. The spectra can be made one-dimensional by inserting a cylindrical lens so that an image of the seismograms is formed in one direction in the same plane that Fraunhofer diffraction occurs in a perpendicular direction. By this means multichannel spectral analysis is performed. An additional lens is used to image the seismogram after the light has passed through the diffraction plane.

AD-614 874 Div. 2

Harvard Coll., Cambridge, Mass. Observatory.
FILAMENTARY STRUCTURE IN SOLAR PROMINENCES,
by Lowell R. Doherty and Donald H. Menzel. 9 May 64, 24p Scientific rept. no. SR-2
Contract AF19 628 3322, Proj. 7649, Task 764906
AFCRL 65-198

Unclassified report

Continuation of Contract AF19 604 4962.
Pub. in Astrophysical Journal v141 n1 p251-71 Jan 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Solar flares, Models (Stimulations)), (*Astrophysics, Solar flares), Sun, Solar atmosphere, Solar corona, Thermodynamics, Magnetohydrodynamics, Mathematical models.

Isobaric steady-state models of prominence filamentary structure similar to the models of Orral and Zirker are computed. The models have cylindrical symmetry and contain uniform longitudinal magnetic fields. Thermal conduction transverse to the field balances the net gain or loss of radiative energy at each point of the filament. To obtain models with central temperatures lower than Orral and Zirker's 30000K an approximate treatment of radiative transfer in the resonance lines of HI, He I, and He II have been concluded. Radiative losses from heavy ions and the effects of absorption of chromospheric and coronal radiation are also included.

AD-614 883 Div. 2, 5, 8

Defence Research Telecommunications Establishment, Ottawa (Ontario).
DIGITAL DETECTION OF CODED-PULSE IONOSONDE SIGNALS,
by D. C. Coll, J. R. Storey, and H. M. Pearce.
5 Oct 64, 2p

Unclassified report

Pub. in Proceedings of the IEEE v53 n2 p188-9 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atmospheric sounding, Telemeter systems), (*Telemeter systems, Atmospheric sounding), Radiosondes, Pulse compression, Coding, Signals, Demodulation, Digital systems, Analog systems, Electronic recording systems.

AD-614 898 Div. 2, 8, 30
CFSTI Prices: HC$2.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
A MULTI-LEVEL RADAR STORM CONTOUR MAPPER, Instrumentation papers,
by William E. Lamkin and David Atlas. Apr 65, 31p
Paper no. IP57, AFCRL 65-214
Proj. 6672, Task 6672 01

Unclassified report

Descriptors: (*Storms, Mapping), (*Mapping, Meteorological radar), (*Meteorological radar, Mapping), Radar echo areas, Intensity, Coding, Integrators, Circuits, Design.

The design and performance of a multi-level radar storm contour mapper is described. The instrument provides six quantized output signals each of which corresponds to a preselected class of signal intensity or reflectivity. The outputs are coded in a stepped grey scale so that a storm echo is mapped in bands of white, grey, and half grey, interspersed by bands of black; each band corresponds to the selected signal category. The contour coding may be altered so that the contour bands appear dotted or dashed. The system incorporates a wide (80 db) dynamic range receiver to permit mapping of severe storms without saturation, and an alarm to alert the operator in the event the uppermost signal category is exceeded. Resistance-Capacitance (RC) range integration is employed to smooth the highly fluctuating precipitation echoes and provide sharp contour boundaries closely representing the true average signal intensity. The addition of relatively simple integrators to the output lines of each reflectivity class would permit the use of the system for areal rainfall measurements. The system's performance with the FPS-6 height-finder radar and the CPS-9 is illustrated. (Author)

AD-614 918 Div. 2, 20
CFSTI Prices: HC$1.00 MF$0.50

Milan Univ. (Italy). Istituto di Scienze Fisiche.
LATITUDE EFFECT ON NEUTRON ALBEDO FLUX,
by G. Boella, G. Degli Antoni, C. Dilworth, G. Pizzi, and L. Scarsi. 1 Mar 65, 11p
Scientific rept. no. SR-4
Contract AF61 052 808
AFCRL 65-225

Unclassified report

Descriptors: (*Neutron spectrum, Atmosphere), (*Atmospheric sounding, Neutron spectrum), Nuclear physics, Albedo, Terrestrial magnetism, Neutron detectors, Astrophysics, Geophysics.

The latitude effect on the neutron albedo flux, near solar minimum, is investigated. It is shown that the variation of counting rate of a neutron detector as a function of residual atmospheric pressure and of latitude is dependent on the 'efficiency versus energy' response of the detector employed. On the basis of the results obtained by the authors and other published data, a qualitative estimate is given of the variation of the albedo neutron energy spectrum and total flux, with geomagnetic cut-off rigidity. (Author)

AD-614 927 Div. 2, 12
CFSTI Prices: HC$2.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
STUDIES OF DAYTIME RADIATION FROM TIROS.
Final rept. for 1 Apr 63-1 Feb 65,
by William Viezee and Paul A. Davis. Feb 65, 32p
Contract AF19 628 2777, Projs. 6698, SRI4448, Task 669803
AFCRL 65-160

Unclassified report

Descriptors: (*Solar radiation, Albedo (Astronomy)), (*Meteorological satellites, Solar radiation), Snow, Temperature inversion, Cloud cover, Height finding, Correlation techniques, Meteorology, Atmosphere, Optical properties.

Analysis of a sample of wintertime data from TIROS IV over the United States shows that snow cover and a low-level temperature inversion tend to mask the relationship between cloudiness and Channel 2 (8-12 microns) temperature. However, both Channel 3 (0.2-6.0 microns) and Channel 5 (0.55-0.75 micron) describe the cloudiness well. For areas with overcast stratiform cloudiness, data from the solar channels of TIROS III and IV are compared with reports of cloud-ceiling height. High clouds and low-based clouds can be readily distinguished from the radiation data on the basis of low and high albedos, respectively. However, no distinct relation

between albedo and ceiling height is evident for the intermediate range of albedos (40 to 60 percent for Channel 5 and 30 to 50 percent for Channel 3). Variations in the solar reflectance measurements with changes in the viewing geometry could not be determined from a sample of closed-mode data because of apparent errors in rectification. A brief resume of contractual work described in previous scientific reports is given. (Author)

AD-615 019 Div. 2
CFSTI Prices: HC$4.00 MF$1.00

Geophysics Corp. of America, Bedford, Mass.
RESEARCH DIRECTED TOWARD DEVELOPMENT OF MORE ACCURATE MODEL ATMOSPHERES WITHIN THE ALTITUDE RANGE 90 KM TO 700 KM AND PREPARATION OF MODEL ATMOSPHERE PUBLICATIONS.
Final rept. for Jul 62-Jul 64,
by Raymond A. Minzner. Nov 64, 117p
Technical rept. no. GCA-TR-64-14-A
Contract AF19 628 1633, Proj. 7673, Task 76731
AFCRL 64-944
Unclassified report

See also AD-614 085.

Descriptors: (*Atmosphere models, Preparation), (*Meteorology, Atmosphere models), Atmospheric sounding, Barometric pressure, Atmospheric temperatures, Density, Solar disturbances, Geophysics, Correlation techniques.

Certain studies concerning various aspects of atmospheric model generation are reported. Six scientific reports are reviewed in the light of the objectives of the contract and their contribution to the general field of atmospheric model development. Each report is summarized with abstract, complete table of contents, and complete reference lists attached. (Author)

AD-615 054 Div. 2

Air Force Cambridge Research Labs., Bedford, Mass.
SIMULTANEOUS MEASUREMENTS AND SPECTRAL ANALYSIS OF MICROPULSATION ACTIVITY.
Physical science research papers,
by R. L. Komack, A. S. Orange, F. X. Bostick, and T. Cantwell. Feb 65, 12p
Paper no. PSRP-83, AFCRL 65-127
Proj. 4600, Task 460008
Unclassified report

Pub. in Nature v204 n4958 p534-7 Nov 7 1964
(Copies available only to DDC users).

Descriptors: (*Electric fields, Earth), Extremely low frequency, Oscillation, Electric currents, Measurement, Graphics, Geophysics, Trinidad, Puerto Rico, Texas.

Earth current micropulsations were recorded simultaneously at Trinidad, Puerto Rico and Austin, Texas during the Fall of 1962. Signals were continuously recorded on paper chart in the frequency band .01 to 1.5 cps. The power spectra of the reduced data exhibit large peaks in the .01 to .07 region, normally considered the region of PC type activity. In this frequency region power spectra of data obtained simultaneously at the three locations are virtually identical, no variations with latitude or longitude are observed. Coherencies above .7 were consistently found between signals in the PC frequency region recorded more than 2,000 miles apart. The investigation of the directional properties of the resultant electric field vector illustrate the strong dependence of this vector on local geology. (Author)

AD-615 058 Div. 2

Lockheed Missiles and Space Co., Palo Alto, Calif.
OBSERVATIONAL RESULT ON X-RAYS,
by Philip C. Fisher, Dwight B. Clark, Arthur J. Meyerott, and Kermit L. Smith. 8 Sep 64, 4p
Contract NAS5 74
Unclassified report

Pub. in Annales D'Astrophysi ue v27 n6 p809-2 Nov-Dec 964
(Copies available only to DDC users).

Descriptors: (*X rays, Night sky), (*Night sky, X rays), Cosmic rays, Sources, Stars, Sounding rockets.

Final results are presented for a March 20, 1963 search for night sky sources of soft X-rays. Although one sky region was found to be associated with an X-ray flux 2,5 to 3 standard deviations above background, the probability of observing one random fluctuation of this importance in the data for the night sky is estimated to be as high as 20%. The region is located at alpha = 23 h 40 m, delta = + 78 degrees. Apparently negative results from a search of the data for variations of X-ray background with galactic latitude are presented and discussed. (Author)

AD-615 064 Div. 2, 15

Michigan Univ., Ann Arbor.
A COMPARISON OF SPHERICAL AND ELLIPSOIDAL MEASURES,
by W. R. Tobler. 1960, 4p
Contract Nonr122448
Unclassified report

Pub. in THE PROFESSIONAL GEOGRAPHER v16 n4 p9-12 Jul 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Geodesics, Measure theory), (*Ellipsoids, Geodesics), (*Spheres, Geodesics), Mapping, Earth models, Geography, Azimuth.

AD-615 078 Div. 2, 15, 25

Uppsala Univ. (Sweden).
ELECTROMAGNETIC RADIATION AND PHYSICAL STRUCTURE OF LIGHTNING DISCHARGES,
by Jacques Papet-Lepine. 1961, 11p
Scientific note no. SN-6
Contract AF61 052 171
AFCRL 62-137
Unclassified report

Pub. in Arkiv for Geofysik v3 n20 Aug 3 1961
(Copies available only to DDC users).

Descriptors: (*Lightning, Electromagnetic fields), (*Electric discharges, Magnetic fields), Electric currents, Statistical analysis, Oscillographs.

A theoretical analysis was carried out based on oscillographically obtained magnetic field variations emitted in the vicinity from vertical lightning strokes. The mechanism and the physical properties of lightning discharges as well as the distributions and the time variation of the lightning currents were treated. Methods of calculating the current variations by the use of the emitted magnetic field variations were discussed. Calculations of the lightning current by the aid of the theoretical method presented in this paper resulted for some individual cases in differences in comparison with

values obtained by the aid of an approximative method conformable to the law of Biot and Savart. Notwithstanding, a comparative statistical analysis based on a more extended amount of data did not give any appreciable differences as to the results when both methods of calculation were applied. (Author)

AD-615 094 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
THE DEVELOPMENT OF A NEW EVAPORATION FORMULA FOR TEXAS.
Master's thesis,
by Roderick Donald Moe. May 65, 89p
Unclassified report

Descriptors: (*Evaporation, Mathematical prediction), Texas, Evapotranspiration, Meteorological parameters, Correlation techniques, Hydrology.

Multiple regression analysis of evaporation measurements, made at substations and field laboratories of the Texas Agricultural Experiment Station, with various meteorological parameters showed a very high correlation of evaporation with mean monthly maximum temperature. The regression equations were plotted as a scalar field on two maps of Texas. From these maps an equation for evaporation can be extracted for any location in Texas. It was found that wind speed and relative humidity had little effect on evaporation from pans in Texas, at least when considered in terms of mean conditions. There is apparently no direct correlation between evaporation and total monthly rainfall. In this report other evaporation equations are reviewed and recommendations for further research on evaporation are discussed. (Author)

AD-615 095 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Texas A. and M Univ., College Station. Dept. of Oceanography and Meteorology.
A COMPARISON OF RAIN GAGE AND DUAL-FREQUENCY RADAR DATA OF PRECIPITATION.
Master's thesis,
by John A. Owens, Jr. May 65, 73p
Unclassified report

Descriptors: (*Meteorological radar, Rainfall), (*Rainfall, Meters), Storms, Raindrops, Radar reflections, Intensity, Correlation techniques.

A dual-frequency radar system of 3.2-cm and 10.3-cm wave lengths was used to measure the reflectivity of a storm cell. The relationship between radar reflectivity, Z, and rainfall rate, R, permits computation of R when Z is measured. In this study, correlation coefficients were computed between measured R and observed Z. The radar pattern is fitted to the actual rainfall intensity pattern. This method, at present, does not lend itself to quantitative measurement of rainfall intensity; however, reliable estimates of the rainfall distribution are possible.

AD-615 096 Div. 2
CFSTI Prices: HC$4.00 MF$1.25

Texas A. and M. Univ., College Station. Dept. of Oceanography and Meteorology.
AN INVESTIGATION OF THE PRECIPITATION DISTRIBUTION AND THE PROBABILITY OF RECEIVING SELECTED AMOUNTS OVER TEXAS.
Master's thesis,
by Joseph E. Tucker. May 65, 125p
Unclassified report

Descriptors: (*Atmospheric precipitation, Texas), (*Climatology, Texas), (*Hydrology, Texas), Meteorological charts, Distribution, Probability, Water supplies, Rainfall, Statistical analysis, Computers, Data processing systems.

The distributions of monthly and annual precipitation amounts for 34 selected Texas stations were investigated in an effort to determine the fit of monthly values to a square-root normal distribution and that of annual amounts to a normal distribution. Forty years of data from each of the 34 stations were processed statistically using the IBM 7090/7094 Programming System. A series of significance tests were used to determine if the assumption of the respective normal distributions is justified. These tests show that 88 per cent of the monthly data and 71 per cent of the annual data are not significantly different from normal. From data which were determined to fit the individual normal distributions, maps of the annual mean and standard deviation and maps of the monthly square-root mean and standard deviation were prepared. (Author)

AD-615 105 Div. 2

Lockheed-California Co., Burbank, Calif.
INTERNAL WAVE STUDY.
Progress rept.,
by A. J. Carsola. 19 Apr 65, 5p
Rept. no. LR-18766
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Pacific Ocean, Thermal properties), (*Oceanology, Pacific Ocean), California, Seacoast, Oceanographic equipment, Thermistors, Telemeter systems, Temperature, Oscillation.

The study is concerned with the investigation of internal waves and other phenomena responsible for temperature variations over the continental borderland off Southern California. Based on the results of the 1962 observational program, a thermistor array was assembled to provide measurements over a sufficiently long observational period to resolve temperature variations with periods from 10 minutes to several months.

AD-615 111 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
SUNSPOT CYCLE AND IONOSPHERIC STORMS.
Environmental research papers,
by Raymond J. Cormier and K. L. Smallwood. Feb 65, 45p Paper no. ERP-88, AFCRL 65-125
Proj. 5631, Task 5631 12
Unclassified report

Descriptors: (*Sunspots, Ionospheric disturbances), (*Ionospheric disturbances, Magnetic storms), (*Magnetic storms, Sunspots),Storms, Upper atmosphere, Electron density, Periodic variations, Solar disturbances.

This study pertains to ionospheric storms and to the F(2) region electron density and nondeviative absorption variations accompanying them. Data for a year of medium (1960) and a year of low (1963) sunspot number are analyzed. An index of ionospheric storminess, which is an indicator

of the amount of expansion and contraction of the HF useful frequency spectrum caused by ionospheric storms, is also discussed. The data used in this study are the amplitude recordings, made at Concord, Mass., of several WWV frequencies originating from Beltsville, Maryland. The path length involved is 590 km. In this paper are discussed: the usefulness and ease of calculation of the storm index; the apparent solar (cos x) control of the F(2) region during a year of low sunspot number; the absorption (mostly nondeviative) accompanying ionospheric and magnetic storms; the differences in average ionospheric storm variations between two years of the sunspot cycle; and the appearance or disappearance of a pronounced f(o)F(1) cusp on the Ft Belvoir ionosonde data which indicates whether an ionospheric storm is accompanied by enhanced or depressed F(2) region electron densities. (Author)

AD-615 138 Div. 2

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
THE DEFLECTION OF THE VERTICAL OF MAJOR GEODETIC DATUMS AND THE SEMIMAJOR AXIS OF THE EARTH'S ELLIPSOID AS OBTAINED FROM SATELLITE OBSERVATIONS,
by G. Veis. 1964, 28p
Unclassified report

Pub. in Space Research (Netherlands) v5 p849-75 1964 (Copies available only to DDC users). Proceedings of the International Space Science Symposium (no. 5) held at Florence, Italy, 8-20 May 64.

Descriptors: (*Astronomical geodesics, Satellite networks), (*Satellite networks, Astronomical geodesics), Position finding, Satellites (Artificial), Orbital trajectories, Celestial mechanics, Earth, Projective geometry.

The geocentric (terrestrial) coordinates of the 12 Baker-Nunn stations are derived from an analysis of 46,535 observations of 13 different satellites, and the absolute deflection of the vertical for 7 datums is determined. Based on those deflections of the vertical and through geoidal fit, the value of a = 6,378169 Mm for the semimajor axis of the earth's ellipsoid is derived. (Author)

AD-615 139 Div. 2

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
THE TEMPERATURE ABOVE THE THERMOPAUSE,
by L. G. Jacchia. 1964, 24p
Unclassified report

Pub. in Space Research (Netherlands) v5 p1152-74 1964 (Copies available only to DDC users). Proceedings of the International Space Science Symposium (no. 5) held at Florence, Italy, 8-20 May 64.

Descriptors: (*Atmospheric temperature, Upper atmosphere), (*Upper atmosphere, Atmospheric temperature), Atmospheric sounding, Satellites (Artificial), Drag, Atmosphere models, Solar disturbances, Geophysics, Correlation techniques.

The conversion of upper-atmosphere densities to temperatures by means of atmospheric models, whether time-dependent or static, is subject to limitations, which are critically examined. Nicolet's model is used to obtain temperatures from the drag of five artificial satellites in the time interval from 1958 to 1963. The temperature variations with solar and geomagnetic activity are reviewed. The relation between the day and night temperatures averaged over one solar rotation and the corresponding decimetric solar flux shows a definite departure from linearity, which is just about the same for the 8 cm and the 10,7 cm flux. The diurnal variation is a very stable feature; its 2 PM maximum and 4 AM minimum do not show any appreciable shift with solar activity, nor does the ratio of the maximum to the minimum temperature, which is close to 1.30. An analytical model of the diurnal variation is presented as a function of solar time and latitude. This model is used to eliminate the day-and-night effect in a study of the semi-annual temperature oscillation, whose amplitude is found to be related to solar activity in the same manner as the atmospheric temperature itself. The original explanation based on the solar wind now appears unlikely. A practical method for the computation of exospheric temperatures as a function of geographic, solar, and geomagnetic parameters is schematically presented. (Author)

AD-615 161 Div. 2

Air Force Cambridge Research Labs., Bedford, Mass.
GEOPHYSICS AND SPACE DATA BULLETIN NO. 4,
ed. by Anne L. Carrigan and Norman J. Oliver.
Apr 65, 184p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.
See also AD-612 083.

Descriptors: (*Geophysics, Periodicals), (*Space environmental conditions, Periodicals), Magnetometers, Cosmic rays, Neutrons, Intensity, Monitors, Radar reflections, High frequency, Electromagnetic waves, Propagation, Extraterrestrial radio waves, Data.

Contents: Component magnetometer; Cosmic ray neutron intensity monitor; Oblique backscatter radar; Oblique H-F propagation; Riometer; Solar radio emission-spectral observations.

AD-615 164 Div. 2, 6, 20
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE TRANSMISSION OF GEOMAGNETIC MICROPULSATIONS THROUGH THE IONOSPHERE AND LOWER EXOSPHERE,
by E. C. Field and C. Greifinger. Apr 65, 43p
Rept. no. RM-4494-ARPA
Contract SD79, ARPA Order 189 61
Unclassified report

Descriptors: (*Magnetohydrodynamics, Ionosphere), (*Terrestrial magnetism, Magnetohydrodynamics), (*Atmosphere, Magnetohydrodynamics), Wave transmission, Exosphere, Mathematical models, High altitude, Nuclear explosions, Detection.

This report is part of RAND's continuing interest in the detection of high-altitude nuclear explosions. In particular, it is concerned with low-frequency hydromagnetic waves similar to those generated by such explosions, and which are detected by ground-current measurements at world-wide locations. In this report, attention is directed to the response of the ionosphere to such low-frequency hydromagnetic disturbances. The purpose is to separate the effects of the medium from those of the source on the transmitted disturbance. (Author)

AD-615 179 Div. 2, 8

National Research Council of Canada, Ottawa (Ontario). Div. of Radio and Electrical Engineering.
Z-R RELATIONAHIPS DEDUCED FROM FORWARD SCATTER DOPPLER MEASUREMENTS.
Revised ed.,
by Lorne H. Doherty. 10 Jul 64, 16p NRC-8244
Unclassified report

Pub. in Journal of Atmospheric Sciences v21 n6 p683-97 Nov 1964 (Copies not available to DDC or Clearinghouse customers)
Revision of manuscript submitted 6 Nov 63.

Descriptors: (*Raindrops, Radar reflections), (*Meteorological radar, Doppler effect), (*Doppler effect, Meteorological radar), Superhigh frequency, Particle size, Radar signals, Scattering, Correlation techniques, Meteorology.

Measurements were made at 9400 Mc/s of the radio wave scattering from raindrops. The experiment involved forward scattering over a short line and included Doppler frequency measurements which provided data on the vertical velocity of the raindrops. Two methods of analysis were used. The first, an integral analysis, which avoided the assumption of constant rainfall rate between tips of a tipping bucket rain gage, assumed Rayleigh scattering and provided Z-R relationships without measurements of drop size. A special feature of the analysis was that a best estimate of the time required for the rain to fall from the scatter volume to the rain gage was obtained from the data itself for each individual storm. Z-R relationships were obtained for individual storms, for different rain dates, rain types and synoptic conditions. It is shown that the variations noted in Z-R relationships for different synoptic conditions are at least partly explainable in terms of different rainfall rate distributions. The second method of analysis made use of certain features of the first method but was based on an exponential drop-size distribution. Using this distribution, the Gunn and Kinzer drop velocity data and Rayleigh scattering theoretical relationships between scattered power, rainfall rate and Doppler frequency were deduced. These relationships were fitted to the experimental data in such a manner as to eliminate all equipment parameters. (Author)

AD-615 184 Div. 2, 31

Marine Physical Lab., Univ. of California, San Diego.
FLIP: AN OCEANOGRAPHIC BUOY,
by Philip Rudnick. 1964, 7p MPL-U-27/64
Contract Nonr221605
Unclassified report

Pub. in Science v146 n3649 p1268-73 Dec 4 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Oceanographic vessels, Spar buoys), (*Spar buoys, Oceanographic vessels), Instrumentation, Acoustics, Oceanology, Marine engineering, Submarine hulls.

FLIP is a manned buoy of 2100 tons maximum displacement and 108-m overall length, capable of being towed and berthed in a horizontal position with about 4-m draft, and of assuming, in sufficiently deep water, a vertical position with 90-m draft. She then becomes a quiet and stable instrument platform, designed particularly for certain observations on sound transmitted under water, but also useful for a variety of other oceanographic observations, some of which are mentioned briefly. A general description of the buoy is given, and some preliminary quantitative information about her response to waves. (Author)

AD-615 192 Div. 2

Uppsala Univ. (Sweden).
THE DISPERSION OF WHISTLERS COMPARED WITH THE GEOMAGNETIC LATITUDES OF THEIR SOURCES.
Research notes,
by Harald Norinder and Edgar Knudsen. 27 Apr 61, 3p Scientific note no. SN-8
Contract AF61 052 07
AFCRL 62-284
Unclassified report

Pub. in Planetary Space Science v5 p326-8 1964 (Copies available only to DDC users).

Descriptors: (*Whistlers, Lightning), (*Lightning, Whistlers), Thunderstorms, Terrestrial magnetism, Correlation techniques, Geophysics, Sweden.

At a station for whistler research outside Uppsala an investigation was carried out during three thunderstorm seasons (1958-60) with the special aim of discovering the relations between lightning discharges and the whistlers which followed them. The recordings were carried out during the summer seasons because it was better able then to check by direction finders both the regions of thunderstorm activity and the occurrence of individual lightning discharges. During periods of whistler activity it was possible to make simultaneous recordings of the geographical location of the actual lightning discharge, the atmospheric wave-form emitted, the numbers of partial discharges and whistlers which followed.

3. Chemical Warfare Equipment and Materials

No entries

4. Chemistry

AD-614 601 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

California State Coll., Los Angeles.
MONOCARBAHEXABORANE(7),
by Thomas Onak, Rogers P. Drake, and Gary B. Dunks. 1 May 65, 5p Technical rept. no. TR-7
Contract Nonr336400, Proj. NR052 427
Unclassified report

Descriptors: (*Boranes, Synthesis (Chemistry)), (*Carbon compounds, Boranes), Electric discharges, Organoboranes, Decomposition, Vapor pressure, Nuclear magnetic resonance, Spectra (Infrared), Mass spectrum, Molecular structure.

In the course of investigating the products of an electric discharge of 1-methylpentaborane a material, CB5H7, was isolated which represents the first known one-carbon carborane. Rv (g.l.c.) = 0.65 (relative to B5H9, Rv = 1.00); vapor tension, 503 mm at 26C; mol. wt. (gas density), 74.4, calc. 73.0. The (11)B n.m.r. of the pure compound displays three sets of doublets (delta = +19.1, J = 184 c.p.s.; delta = +9.7; J = 162 c.p.s. Boron trifluoride was used for the external standard. Delta = -2.5, J = 174 c.p.s.) with an area ratio of 2:2:1, respectively, which together with the molecular weight data, clearly indicates the presence of five borons. Additionally, the coupling constants for the observed doublets signify the attachment of one terminal hydrogen to each boron. The infrared spectrum exhibits a medium intensity, C-H (2960/cm), strong B-H (2640/cm) and medium B-H-bridge-B symmetric (2167/cm) stretching frequencies. However, a maximum of one bridge hydrogen and one hydrogen bonded to carbon is evident from a (1)H n.m.r. area analysis. The above evidence requires a molecular formula of CB5H7. An octahedral structure is proposed. (Extracted)

AD-614 690 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Indiana Univ., Bloomington.
SYNTHESIS AND REACTIONS OF UNSYMMETRICAL DISULFIDES AND DISULFONES. RING-CLOSURE REACTIONS OF BETA-ARYLETHYL DISULFIDES.
Quarterly status rept. no. 1, 1 Jan-31 Mar 61,
by E. Campaigne and B. G. Heaton. 25 Apr 61, 24p
Contract DA33 008ORD1916, Proj. 2192
AROD 2192:3
Unclassified report

Descriptors: (*Thiophenes, Synthesis (Chemistry)), (*Sulfides, Chemical reactions), Organic sulfur compounds, S-heterocyclic compounds, Polycyclic compounds, Molecular structure, Stereochemistry, Catalysis, Solvents.

Bis-o-biphenylyl disulfide was found to cyclize to dibenzothiophene in excellent yield when treated with iodine in refluxing ethylene glycol. Under similar conditions, bis-beta-2-naphthylethyl disulfide gave a poor yield of 2,3-dihydronaphtho-(1,2-b)thiophene. Using excess iodine, the product is mainly naphtho(1,2-b) thiophene. These products were identified by conversion to picrates and oxidation to naphtho(1,2-b)thiophene-1,1-dioxide. Bis-1-phenylcyclohexyl disulfide, prepared from X-acetyl-2-phenylcyclo-hexanethiol, could not be cyclized under the influence of iodine in ethylene glycol. A large percentage of the disulfide was recovered, along with some biphenyl. (Author)

AD-614 718 Div. 4

Pittsburgh Univ., Pa.
A ROUTE TO ALDEHYDES AND KETONES BY A FOUR-ELECTRON DECARBOXYLATIVE OXIDATION UTILIZING PYRIDINE N-OXIDE,
by Theodore Cohen, Il Hwan Song, and John H. Fager.
3 Dec 64, 6p
Contract AF49 638 788; Grant AF AFOSR344 63
Proj. 9762, Task 9762 02
Unclassified report

Pub. in Tetrahedron Letters n4 p237-41 1965
(Copies available only to DDC users).

Descriptors: (*Aldehydes, Synthesis (Chemistry)), (*Ketones, Synthesis (Chemistry)), (*Carboxyclic acids, Oxidation), (*Anhydrides, Oxidation), (*Pyridines, Chemical reactions), Oxides, Substitution reactions, Esters.

A 4-electron decarboxylative oxidation is reported. A probable reaction mechanism for the case of phenylacetic acid is presented which involves the nucleophilic rather than electrophilic attack of the alpha position of a carboxylic acid. The results of reactions of anhydrides and acids with pyridine N-oxide are given in a table. (Author)

AD-614 728 Div. 4, 2, 25

Marine Physical Lab., Univ. of California, San Diego.
MULTISTATE DISSOCIATION AND THE EFFECT OF PRESSURE ON THE EQUILIBRIUM ON MAGNESIUM SULFATE,
by F. H. Fisher. 8 Aug 64, 3p MPL-U-31/64
Contract Nonr221605
Unclassified report

Pub. in Journal of Physical Chemistry v69 n2 p695-6 Feb 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnesium compounds, Sulfates), (*Ultrasonic radiation, Absorption), Sea water, Electrolytes, Dissociation, Chemical equilibrium, Pressure, Electrical conductance.

A four-state model of the dissociation of aqueous solutions of MgSO4 proposed by Eigen and Tamm to explain ultrasonic absorption at atmospheric pressure is used to calculate the effect of pressure on the molal equilibrium constant as it would be measured by conductivity apparatus. The relationship of the partial molal volume changes in each step of the multistate reaction to the difference in partial molal volumes as observed by conductivity experiments is pointed out. Using the Eigen and Tamm model it is shown that this difference = -7.7 cc/mole which compares very well with the value of -7.3 cc/mole obtained from conductivity experiments of Fisher, and the theoretical value of -7.4 cc/mole calculated by Hamann using the theory of ion association by Fuoss. (Author)

AD-614 747 Div. 4

California Univ., Berkeley.
PREPARATION OF INERT-GAS COMPOUNDS BY MATRIX ISOLATION: KRYPTON DIFLUORIDE,
by J. J. Turner and G. C. Pimentel. 1963, 6p
Contract AF49 638 944
AFOSR 65-0523
Unclassified report

Pub. in Hyman: Noble-Gas Compounds p101-5 1963.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Helium group gases, Chemical reactions), (*Fluorides, Helium group gases), (*Krypton, Chemical compounds), (*Xenon, Chemical compounds), Argon, Solidified gases, Synthesis (Chemistry), Spectrographic analysis, Spectrum (Infrared).

The matrix isolation method involves the suspension of unstable 'inert-gas' compounds in an inert solid matrix and investigating their properties spectroscopically. The method was applied to the preparation and chacterization of xenon di- and tetrafluorides from fluorine-xenon-argon gas mixtures, and of krypton difluoride from a fluorine-krypton-argon mixture. Argon fluorides could not be similarly obtained from argon-fluorine mixtures.

AD-614 755 Div. 4

Kent State Univ., Ohio.
PURE ACETIC ACID AND ACETIC ANHYDRIDE AND THE ELECTRICAL CONDUCTANCE AND DIELECTRIC CONSTANT OF THIS SYSTEM,
by R. Thomas Myers. 16 Sep 64, 3p
Contract AF49 638 641
AFOSR 65-0677
Unclassified report

Pub. in Journal of Physical Chemistry v69 n2 p700-2 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Carboxylic acid, Physical properties), (*Anhydrides, Physical properties), Purification, Density, Electrical conductance, Dielectric properties, Refractive index.

The density, electrical conductance, and dielectric constant of the system acetic acid-acetic anhydride are reported, along with novel--but very simple--methods of purifying these substances. (Author)

AD-614 959 Div. 4, 10
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF DEPARAFFINIZATION,
by A. A. Chesnokov, K. M. Badyshtova, and K. K. Denisenko. 14 Apr 65, 5p FTD-TT-64-1196
TT 65-62148
Unclassified report

Unedited rough draft trans. of Russian patent 161847, appl. 855004/23-4, Aug 31 1963.

Descriptors: (*Oils, Purification), Tars, Hydraulics, Filters (Fluid), Catalysts, Patents, USSR.

The invention involves a method of deparaffinization of refined products of oil by a selective purification, with their preliminary purification of tarry substances, which is distinguished by the fact that, for the preliminary purification, hydraulic purification is used. (Author)

AD-615 073 Div. 4

North Dakota State Univ., Fargo.
EXTRACTION OF Fe (III) AND In (III) FROM AQUEOUS HC1 BY TRI-n-OCTYLAMINE IN NITROBENZENE,
by A. D. Nelson, J. L. Fasching, and R. L. McDonald.
21 May 64, 10p
Grant AF AFOSR65 63
AFOSR 65-0680
Unclassified report

Pub. in Journal of Inorganic and Nuclear Chemistry v27 p439-47 1965 (Copies available only to DDC users).

Descriptors: (*Iron, Solvent extraction), (*Indium, Solvent extraction), (*Amines, Solvent extraction), (*Hydrochloric acid, Solvent extraction), (*Solvent extraction, Amines), Nitrobenzenes, Chemical equilibrium, Complex compounds, Molecular association, Dissociation.

A study was made of the distribution of Fe(III) and In(III) between aqueous HC1 and solutions of tri-n-octylamine (TOA) in nitrobenzene at trace metal concentrations and under metal loading conditions. The equilibrium between tri-n-octylamine and HC1 was also investigated. The equilibrium constant for the reaction TOA + (HC1) = TOAC H1 was found to be 560,000 over the amine salt concentration range .0017 to .095M; TOAHC1 appears to be an essentially undissociated ion pair in nitrobenzene. The metal extraction data were interpreted in terms of the extraction of the tetrachloro metal anions. The possibility of the addition of one or more amine hydrochlorides to the extracted metal species must also be considered; these 'extra hydrochlorides' are not bound directly to the metal but, rather, are the result of electrostatic interactions. The results give not only an interestingexample of the effect of organic phase ionization on the distribution ratio, but also emphasize the hazards of drawing conclusions concerning the metal species extracted fromequilibrium extraction data. (Author)

AD-615 122 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Wisconsin Univ., Madison.
REACTIONS BETWEEN SECONDARY AMINES AND ORGANOHALOGENATING AGENTS.
Semi-annual rept. no. 3, 1 Jul-31 Dec 64,
by Takeru Higuchi. 14 Jan 65, 25p
Contract DA18 108AMC209A
Unclassified report

See also AD-612 010.

Descriptors: (*Amines, Halogenation), (*N-heterocyclycic compounds, Chemical reactions), (*Oxidizers, Halogens), (*Halogenation, Thermochemistry), Standards, Hypochlorites, Chlorination, Reaction kinetics, Chemical equilibrium, Exchange reactions, Amides, Succinates, Degradation, Volumetric analysis, Chromatographic analysis, Ultraviolet spectroscopy.

Relative thermodynamic activities of fourteen different potential organochlorinating agents were investigated. It is shown that chloroquinuclidinium ionic species is a convenient comparison standard which can be used to bridge the gap between weak organochlorinating compounds and strong agents such as molecular chlorine and hypochlorous acid. Additional information concerning the mechanism of degradation of n-chlorosuccinimide is also presented. (Author)

AD-615 124 Div. 4, 7, 10, 27

Malaker Labs., Inc., High Bridge, N. J.
KINETIC STUDY OF ROCKET EXHAUST GASES.
Final rept. for period ending 30 Apr 65,
30 Apr 65, 49p Rept. no. 103-12
Contract DA30 069ORD2918, Proj. 1A22901A211
Unclassified report

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Descriptors: (*Rocket propellants, Combustion products), (*Exhaust gases, Dynamics), (*Energy conversion, Exhaust gases), (*Combustion products, Test methods), Electric power production, Gas ionization, Plasma medium, Additives, Burning rate, Test equipment, Optical equipment, Flames, Temperature, Photometers.

The initial objective of this program was to investigate the feasibility of devices for extraction of electrical energy from rocket engine exhaust streams. An extensive literature search was conducted, a comprehensive bibliography prepared (published in PB-153 966) and an analytic study performed based on a physical model deduced from the most accurate experimental evidence available. Subsequently, a study of the subtle changes induced in the solid propellant combustion process by introduction of additives was undertaken. These additives, in general, modify the burning rates of propellant material. Various optical diagnostic techniques were employed to identify species concentration by flame zones and to obtain localized temperatures and total visible radiation values with good time resolution. (Author)

AD-615 133 Div. 4, 10

Aerojet-General Corp., Azusa, Calif.
REACTION OF PENTABORANE AND HYDRAZINE AND THE STRUCTURE OF THE ADDUCT,
by H. V. Seklemian, R. W. Lawrence, and G. A. Guter.
1964, 11p
Contract AF49 638 1122
AFOSR 65-0695
Unclassified report

Presented as Preprint 63-503 at the AIAA Heterogeneous Combustion Conference, Palm Beach, Fla., Dec 11-13, 1963. Pub. in Progress in Astronautics and Aeronautics v15 p391-401 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Rocket propellants, Chemical reactions), (*Pentaboranes, Chemical reactions), (*Hydrazine, Chemical reactions), Organic solvents, Cyclohexanes, Reaction kinetics, Complex compounds, Hydrogen, Solubility, Pyrolysis.

Pentaborane and hydrazine react in a 1 to 2 molar ratio in dilute cyclohexane solution at a measureable rate by a first order process. The products formed are a white insoluble adduct and one half mole of hydrogen gas per mole of pentaborane used. At low concentrations of reactants, the reaction is first order and zero order reactions. The initial rate is independent of pentaborane concentration and first order with respect to hydrazine. This evidence indicates that there is a soluble intermediate which loses hydrogen by a first order process. At higher concentrations it is believed that the solubility of the intermediate is exceeded and the insoluble portion then decomposed by a first order process. In all the solvents tried which did not react the adduct was found to be insoluble. Thermal decomposition of the adduct did not evolve all of its hydrogen even when heated to 960C. (Author)

AD-615 134 Div. 4

California Univ., Berkeley.
ACIDITY OF HYDROCARBONS. XVI. EQUILIBRIUM ACIDITIES OF HYDROCARBON ACIDS IN CYCLOHEXYLAMINE,
by A. Streitwieser, Jr., J. I. Brauman, J. H. Hammons, and A. H. Pudjaatmaka. 8 Sep 64, 3p
Grant AF AFOSR554 64
AFOSR 65-0683 Unclassified report

Pub. in Journal of the American Chemical Society v87 n2 p384-5 Jan 20 1965 (Copies not available to DDC or Clearinghouse customers). See also AD-611 605.

Descriptors: (*Hydrocarbons, pH), (*Acids, Chemical equilibrium), (*Metalorganic compounds, Chemical equilibrium), Cyclohexanes, Amines, Cesium compounds, Lithium compounds, Polycyclic compounds.

Equilibrium constants were determined in cyclohexylamine for reactions A(-)M(+) + BH reversibly yields AH + B(-)M(+) in which AH and BH are hydrocarbons whose corresponding carbanions show usable spectral differences and M is lithium or cesium. The solutions were made up on a vacuum line with careful exclusion of air and moisture using known amounts of hydrocarbons and solvent and amounts of lithium cyclohexylamide or cesium cyclohexylamide such that measurable amounts of all four components were present. The organocesium compounds studied obeyed Beer's law over a concentration range of at least 10-fold. The lithium salts of all compounds more acidic than p-biphenylydiphenylmethane also obeyed Beer's law, but Beer's law correlations could not be obtained for solutions of p-biphenylydiphenylmethane, triphenylamide-cyclohexylamine. It is clear from the differences between the cesium and lithium salts of these hydrocarbons that the acidity of cyclohexylamine relative to hydrocarbons depends on the metal used. The procedure establishes relative equilibrium acidities; however, it is convenient to record the results as absolute pK values. One of the important aspects of the present results is their confirmation of McEwen's approximate assignments. (Extracted)

AD-615 137 Div. 4, 25

Florida State Univ., Tallahassee.
THE NUCLEATION OF LONG-CHAIN MOLECULES IN MONOMOLECULAR LAYERS,
by L. Mandelkern, J. G. Fatou, and C. Howard.
5 Oct 64, 4p
Grant DA AROD31 124G448
AROD 4222:4
Unclassified report

Pub. in Journal of Physical Chemistry v69 n3 p956-9 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Polymers, Nucleation), (*Nucleation, Polymers), (*Monomolecular films, Polymers), Crystallization, Polyethylene plastics.

The effect of finite chain length on the nucleation of long-chain molecules whose sequences are deposited in monomolecular layers was considered. As in the case of three-dimensional nucleation significant differences in the critical requirements for nucleus formation are found between the infinite chain and chains having less than about 10,000 bonds. In particular it is observed that the free energy of forming a critical nucleus does not become infinite at the melting temperature of the finite chain. These results were applied to previously published data on the lineal growth rate of spherulities into molecular weight fractions of polyethylene. It is shown that, irrespective of molecular weight, the data can be described by the same interfacial energies and pre-exponential factor over the range M = 3,900 to 87,000 where data are available. (Author)

AD-615 169 Div. 4, 3
CFSTI Prices: HC$1.00 MF$0.50

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.

A KINETIC STUDY OF THE LIPOAMIDE DEHYDROGENASE-NADH-DYE REACTION.
Rept. for Jan-Jun 64,
by George G. Guilbault, Paul Goldberg, and David N. Kramer. Apr 65, 20p Technical rept. no. CRDL-R-3275
Proj. 1C622401A102, Task 1C622401A10204
Unclassified report

Descriptors: (*Oxidoreductases, Reaction kinetics), (*Nucleotides, Reaction kinetics), (*Dyes, Reaction kinetics), Chemical indicators, Fluorescence, Colorimetric analysis, N-heterocyclic compounds, Resorcinol, Phenols.

Because of the inhibition of the enzyme lipoamide dehydrogenase, diaphorase, by sulfhydryl binding compounds, interest developed in the mechanism by which this enzyme acts on various substrates. The application of fluorometric and spectrophotometric techniques to study the kinetics of the diaphorase-NADH-dye reaction is illustrated. Differences are observed in the kinetic relationships depending on the synthetic substrate: resazurin or dichloroindophenol. For resazurin, initial reaction velocities are independent of NADH concentration, but in the instance of the indophenols, a dependence on NADH was found. These results have been interpreted on the basis of a particular enzymatic reaction scheme, in which the substrate is reduced by a reduced form of the enzyme, rather than by an enzyme-NADH complex. (Author)

AD-615 171 Div. 4
CFSTI Prices: HC$2.00 MF$0.50

Frankford Arsenal, Philadelphia, Pa.
Research and Development Directorate.
DETERMINATION OF ETHYLENE DIMETHACRYLATE (ETHYLENE GLYCOL DIMETHACRYLATE) IN NITROCELLULOSE-BASE PROPELLANTS BY SAPONIFICATION, BROMINATION, AND INFRARED,
by George Norwitz and Julius B. Apatoff. Mar 65, 35p Test rept. T65-12-1
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Glycols, Chemical analysis), Nitrocellulose, Propellants, Production, Infrared spectroscopy, Volumetric analysis, Bromination.

Ethylene glycol dimethacrylate is determined in nitrocellulose-base propellants by saponification, bromination, and infrared. In the saponification method the ethylene dimethacrylate is saponified after extraction with methylene chloride. A slight correction should be made for the nitration products of diphenylamine which react with alkali. In the bromination method the ethylene dimethacrylate is determined by titration with potassium bromate after extraction with methylene chloride. A correction must be made for diphenylamine which is also brominated. Diphenylamine in propellants containing ethylene dimethacrylate must be determined after a steam distillation, using either the gravimetric of titrimetric bromination technique; it cannot be determined gravimetrically in the solvent extract because of interference by ethylene dimethacrylate. In the infraredmethod the ethylene dimethacrylate is extracted with methylene chloride and the ester peak at 5.78 microns is measured in the methylene chloride solution. The saponification, bromination, and infrared methods give approximately the same results. (Author)

AD-615 176 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Canterbury Univ., Christchurch (New Zealand).
GAS PHASE REACTIONS,
by L. F. Phillips. Mar 65, 3p
Grant AF AFOSR264 63
AFOSR 65-0676
Unclassified report

Descriptors: (*Gases, Chemical reactions), (*Nitrogen, Chemical reactions), (*Flames, Chemical reactions), Halides, Halogens, Oxygen, Hydrogen, Nitrogen compounds, Dioxides, Reaction kinetics, Line spectrum, Mass spectrum, New Zealand.

Brief summaries are given concerning photometric investigations of metal halides and halogens with active nitrogen, and of reactions in oxygen-rich hydrogen flames; and concerning mass spectrometric investigations of nitrogen atoms with nitrogen dioxide.

AD-615 181 Div. 4

Atlantic Research Corp., Alexandria, Va.
THE KINETICS OF THE HYDROGEN, FLUORINE REACTION. II. THE OXYGEN-INHIBITED REACTION,
by Joseph B. Levy and B. K. Wesley Copeland.
9 Jun 64, 9p
Contract AF49 638 1131, Proj. 9750, Task 975002
AFOSR 65-0693
Unclassified report

Pub. in Journal of Physical Chemistry v69 n2 p408-16 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrogen, Reaction kinetics), (*Fluorine, Reaction kinetics), (*Hydrogen compounds, Fluorides), (*Fluorides, Synthesis (Chemistry)), Colorimetry, Oxygen, Inhibition, Heat of activation, Heat of formation.

The kinetics of the thermal, gaseous hydrogen-fluorine reaction were investigated by a colorimetric technique. The reaction was found to be inhibited by oxygen and the inhibited reaction was studied mainly at 132C, but also from 122 to 162C. The experiments were performed at a total pressure of about 645 mm., with oxygen varying from about 85 to 500 mm. Nitrogen and helium were used to maintain the total pressure at the desired value. Hydrogen and fluorine pressures were in the general range of about 20-80 mm. It was found that the rate decreases with added oxygen but reaches a limiting value unaffected by further oxygen addition. The limiting rate obeys the expression $-d(F2)/dt = k(F2)(H2)(1/2)$ fairly well, but the curves of the integrated forms are linear only for about the first 50% of reaction, dropping off thereafter. The Arrhenius plot for the rates from 132C to 162C is linear, yielding an activation energy of 16.7 kcal./mole. The results are discussed in terms of a chain reaction involving the propagation steps, H + F2 yields HF + F; F + O2 + M yields FOO + M; and FOO + H2 yields HF + O2 + H. Evidence is presented for an activation energy of 5-7 kcal./mole for the reaction F + H2 yields HF + H and for a heat of formation for the FOO species of +3.5 kcal./mole. (Author)

AD-615 185 Div. 4, 25

Minnesota Univ., Minneapolis. Dept. of Chemistry.
SHOCK WAVES IN CHEMICAL KINETICS. THE DISSOCIATION OF MOLECULAR CHLORINE,
by Mathias van Thiel, Daniel J. Seery, and

Doyle Britton. 27 Jul 64, 6p
Contract DA31 124AROD161
AROD 2062;10

Unclassified report

Pub. in Journal of Physical Chemistry v69 n3 p834-9 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Shock waves, Reaction kinetics), (*Chlorine, Dissociation), Argon, Heat of activation, Emissivity, Recombination reactions, Temperature.

From spectrophotometric observations on shock waves in chlorine-argon mixtures the rate of dissociation of molecular chlorine in the presence of argon was measured at temperatures between 1600 and 2600K. In mixtures of 5% Cl2 and 95% Ar the results may be summarized by log kD (/mole 1./sec.) = 10.66 - 9930/T. This corresponds to an apparent activation energy of 45 ± 2 kcal./mole. Emission of light due to radiative recombination of chlorine atoms complicated the study of the dissociation process and had to be corrected for. From the change in the rate of emission with temperature, activation energies for the emission as a function of the wave length could be determined. (Author)

AD-615 188 Div. 4, 25

Stevens Inst. of Tech., Hoboken, N. J. Dept. of Chemistry and Chemical Engineering.
SUBSTITUENT EFFECTS. IV. CORRELATION OF TIN-PROTON SPIN-SPIN COUPLING CONSTANTS BY PAIRWISE INTERACTIONS,
by Theodore Vladimiroff and Edmund R. Malinowski.
10 Aug 64, 2p
Contract DA31 124AROD90
AROD 3930:2

Unclassified report

Pub. in Journal of Chemical Physics v42 n1 p440-2 Jan 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Metalorganic compounds, Tin compounds), (*Tin compounds, Nuclear spins), (*Nuclear magnetic resonance, Tin compounds), Protons, Equations.

It is reported that not only directly bonded but also nondirectly bonded tin-proton couplings, which deviate severely from 'direct' additivity, can be correlated with a given pairwise interaction equation.

AD-615 191 Div. 4

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
PAPER PARTITION CHROMATOGRAPHY OF MIXTURES OF CHLORIDE, CHLORITE, CHLORATE AND PERCHLORATE,
by Bernice L. Harrison and David H. Rosenblatt.
29 May 63, 8p CRDL Special Publication no. CRDL-SP-3-22
Task 1C622401A09501

Unclassified report

Pub. in Journal of Chromatography v13 p271-2 1964 (Copies available only to DDC users).

Descriptors: (*Chlorates, Chromatographic analysis), (*Chlorides, Chromatographic analysis), (*Chlorites, Chromatographic analysis), (*Perchlorates, Chromatographic analysis).

An improved method for qualitative analysis of mixtures containing chloride, chlorite, chlorate, and perchlorate has been developed. This method utilizes paper partition chromatography and differential spray reagents for location of the separated spots. (Author)

5. Communications

AD-614 775 Div. 5, 30
CFSTI Prices: HC$3.00 MF$0.75

Army Electronics Command, Fort Monmouth, N. J.
TESTING OF DIGITAL DATA TRANSMISSION SYSTEMS,
by James E. Bartow. Feb 65, 82p
Technical rept. no. ECOM-2558
Proj. 1E641209D535, Task 1E6 41209D535 12

Unclassified report

Descriptors: (*Communication systems, Tests), (*Data transmission systems, Digital systems), Radio communication systems, Telephone communication systems, Transmission lines, Test methods, Military requirements.

This report describes tests performed on various communication systems to determine their capability to pass digital data. A collection of test results from many sources has been gathered. Experiments on HF, VHF, UHF and SHF radios, and on cable and wire systems, etc., are included. Preliminary results of several experimental programs which have not been published previously are presented. An analysis of the data is made. The significance of the results in terms of specifying and designing a communication channel to optimize its inter-operation with a data processing system is explained. An outline is presented of further tests required to determine basic communication limitations, to discover causes of digital errors, and to verify specific data/communication system performance. (Author)

AD-614 887 Div. 5, 12

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A PROPOSED SPACECRAFT-TO-EARTH COMMUNICATIONS LINK; THE UNIFIED CARRIER APPROACH,
by J. G. Barry, G. F. Dalrymple, J. C. Fielding, B. S. Goldstein, and W. F. Higgins. 28 Aug 63, 11p

Unclassified report

Pub. in IEEE TRANSACTIONS ON COMMUNICATION AND ELECTRONICS v83 n75 p593-603 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Space communication systems, Spacecraft), (*Spacecraft, Space communication systems), (*Earth, Space communication systems), Pulse modulation, Frequency modulation, Lunar craft, Lunar probes, Simulation, Signal-to-noise ratio, Transmitter-receivers, Wave analyzers, Ranges (Distance), Statistical analysis, Tracking, Integral equations, Electromagnetic waves, Design.

This paper documents the design and performance of a proposed unified carrier, range-tracking, and communications system for cislunar ranges in which phase-locked loop techniques are used in the spacecraft to relate received and transmitted carriers coherently. The design of the composite angle-modulated carrier waveform for the spacecraft-to-ground link has been accomplished by using a statistical method of waveform design. The pseudonoise ranging code is biphase; telemetry is pulse-code modulated (PCM); and voice is frequency modulated (FM). The 'best'

selection of modulation parameters and frequency locations for the various functions has been determined by a method of successive iteration. The unified carrier system has been tested for a simulated lunar mission for spacecraft velocities of 36,000 ft/sec (feet per second), and the results indicate that the statistical method of waveform design used is practical for this case. (Author)

AD-614 938 Div. 5
CFSTI Prices: HC$3.00 MF$0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
UNSCHEDULED COMMUNICATION IN A COMMON FREQUENCY CHANNEL.
Technical rept.,
comp. by Donald P. Harris. Jan 61, 56p
LMSD-895081
Contract AF04 647 595

Unclassified report

Descriptors: (*Communication theory, Broadband), (*Broadband, Communication systems), Correlation techniques, Coding, Discriminators, Radio signals, Separation, Filters (Electromagnetic waves), Signal-to-noise ratio, Radiofrequency interference.

The report presents some results of a study of a communications concept in which the entire available portion of the electromagnetic spectrum is independently used by each of a multiplicity of wide-band communication links. The resulting signals must therefore be separated by correlation techniques that are more general than the simple time-gating and frequency-selective filtering procedures commonly employed for signal selection purposes. Shannon's channel capacity expressions are used to develop fundamental relationships between the potential performance advantages of the proposed techniques and the required system characteristics. Consideration is given to a number of factors which may have significant practical influence on the merits of such systems. A performance analysis is made of a conceptual system that might be designed using present techniques. The results suggest that significant advances are needed in implementation techniques in order to realize the moderate potential capacity advantages offered by systems of the proposed type. (Author)

AD-614 945 Div. 5, 8, 30
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CALCULATION OF FIELDS OF MAGNETIC HEADS ON AN ELECTRONIC COMPUTER,
by N. G. Zagoruyko and V. I. Rozenberg. 13 Apr 65, 32p FTD-TT-64-852
TT 65-62134

Unclassified report

Unedited rough draft trans. of mono. Raschet Polei Magnitnykh Golovok na Elektronnoi Vychislitel'noi Mashine, Novosibirsk, 1961 p2-33.

Descriptors: (*Magnetic recording systems, Magnetic fields), (*Magnetic fields, Mathematical analysis), Programming (Computers), Conformal mapping, USSR.

The paper deals with the calculation of magnetic dissipation fields in the head gap used in magnetic signal recording on a wire carrier. The algorithms and the special features of the programs utilized for the solution of such problems on an electronic computer are described. The results of the field calculations are analyzed; on the basis of these results the effect is studied which the various parameters of the head, carrier and signal have on the recording characteristics, in particular on such a specific type of distortion as the 'twisting effect'. (misalignment effect). The paper is of interest to specialists in the domain of magnetic field calculations and in the domain of magnetic signal-recording. (Author)

AD-615 153 Div. 5, 7
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
EMERGENCY DISTRESS SIGNALING DEVICES.
Final rept.,
by J. M. Marzolf. 26 Mar 65, 9p Rept. no. NRL-6223
Proj. RR008 03 46 5675

Unclassified report

Descriptors: (*Communication equipment, Distress signals), (*Distress signals, Communication equipment), Marine safety equipment, Power equipment, Water-activated batteries, Sea water, Magnesium, Sound signals, Underwater sound signals, Electroacoustic transducers, Radio transmitters, Very high frequency, Medium frequency, Tunnel diodes, Transistors, Radio signals, Visual signal, Flash lamps, Inverters, Communication systems.

A study was made of some of the factors involved in providing suitable emergency distress signaling devices to aid in the location of lost personnel or vehicles. One factor particularly considered was a suitable source of electrical power. The magnesium sea-water battery with tunnel diode converter is proposed as being particularly applicable as a power source for marine environments. With the possible exception of size and weight this power source would best meet the following requirements: low cost, reliability, indefinite shelf life, small size and weight, ruggedness, capability of automatic activation, and adequate lifetime for location by search parties. Several typical devices using sea-water batteries with tunnel diode converters were devised, including an audio device to be located by sonar-equipped search vessels, a visual (flashing light) device, and three radio transmitters to transmit SOS's or audible tones. Considerations of the three radio transmitters indicate a preference for vhf operation. Although developed primarily as distress signaling devices, some of the devices might also be useful as markers for marine buoys or small boats or as navigational beacons. (Author)

6. Detection

AD-614 703 Div. 6, 16, 28, 30
CFSTI Prices: HC$5.00 MF$1.25

Goodyear Aerospace Corp., Akron, Ohio.
INTERPRETATION OF COMPLEX IMAGES: LITERATURE SURVEY.
Revision,
by R. H. Kause. 10 Feb 65, 191p
Rept. no. GER-10830 Rev. A
Unclassified report

Revision of GER-10830, 1 Oct 62, prepared under Contract AF33 657 9476.

Descriptors: (*Target recognition, Visual perception), (*Photointerpretation, Visual perception), (*Visual perception, Pattern recognition), (*Pattern recognition, Images), Reviews, Abstracting, Psychophysiology.

This report is a review of the literature that might aid in measuring or describing complex images as stimuli, in relating this variable to the psychophysics of target identification, and in further specifying variables that may be important determinants of target identifiability. The body of this report is in four sections: (1) abstracts of articles containing general perceptual material, especially theories of form recognition or target identification; (2) abstracts of articles concerned with the experimental manipulation of perceptual variables known to be important determiners of form recognition and target identification; (3) articles concerned with measuring, changing, or simulating image parameters in some specified manner; and (4) abstracts of articles on the special characteristics of various sensor systems that will affect the resulting images used by the operator.

AD-614 798 Div. 6, 26
CFSTI Prices: HC$1.00 MF$0.50

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURE TO INVESTIGATE PROPERTIES OF INDIUM ANTIMONIDE AND TO PROVIDE 801-C6 INFRARED DETECTORS.
Quarterly progress rept. no. 8, 27 Sep-27 Dec 64,
by H. Duane Adams and William L. Kolander.
27 Dec 64, 17p Rept. no. 03-65-19
Contract DA36 039AMC01463E, Proj. S4089
Unclassified report

See also AD-609 091.

Descriptors: (*Infrared detectors, Manufacturing methods), (*Indium alloys, Antimony alloys), Production, Vacuum apparatus, Life expectancy, Storage, Tests, Photoconductivity, Surface properties, Performance (Engineering).

The production phase is in progress with its completion scheduled to occur in March 1965. Due to relocation of facilities a revised delivery schedule was prepared, submitted and approved. Average heat leak change on detectors monitored for 5600 hours is only 0.03 watts; indicative of good vacuum retention. Additional vacuum retention data and electrical parameter information will be obtained in a shelf life test scheduled to start in February. Substrate cooling during placement of cold shields and modified SiO deposition methods have resulted in increased overall yields. (Author)

AD-614 971 Div. 6, 5
CFSTI Prices: HC$1.00 MF$0.50

Melabs, Palo Alto, Calif.
DEVELOPMENT OF EXPERIMENTAL ELECTRONICALLY TUNED, DECADE-BANDWIDTH RECEIVER.
Interim rept. for Feb-Jun 64,
by Beryl Barber and Herbert Weil. Mar 65, 25p
Contract AF30 602 3298, Proj. 5573, Task 557301
RADC TDR-64-496
Unclassified report

Descriptors: (*Radio interception, Ultrahigh frequency), (*Radio receivers, Radio interception), Low-pass filters, Frequency converters, Radio scanning, Band-pass filter, Tunnel diodes, Amplifiers, Intermediate frequency amplifiers, Demodulators, Diodes (Semiconductor), Sensitivity, Tuning devices, Pumping (Electronics).

Progress is reported on work to develop an experimental model of an electronically tunable receiver operating between 300 and 3000 mc with a sensitivity of -90 dbm and high dynamic range. The essentially solid state design basically consists of a low-pass input filter, upconverter and associated X-band sweeper, bandpass filter, tunnel-diode amplifier, downconverter, and i -f amplifier-detector. Advances in tunnel-diode amplifier technology have precluded the need for an originally planned saturation-control circuit. (Author)

AD-615 034 Div. 6, 12
CFSTI Prices: HC$4.00 MF$0.75

Mitre Corp., Bedford, Mass.
TIME AND COORDINATE SYSTEM STUDIES,
by Richard K. Gardner. Mar 65, 110p TM-04059
Contract AF19 628 2390, Proj. 496 2
ESD TDR-64-627
Unclassified report

Descriptors: (*Time signals, Tracking), (*Tracking, Satellites (Artificial)), (*Time, Standards), Position finding, Frequency, Ionosphere, Propagation, Atomic clocks, Clocks, Crystal oscillators, High frequency, Low frequency, Very low frequency.

The state of the art is described in the determination and dissemination of time and the coordinate systems for satellite tracking. The report also recommends methods for improving the capabilities of the Space Track system. (Author)

7. Electrical Equipment

AD-614 572 Div. 7, 8, 31

American Monarch Corp., Minneapolis, Minn.
MULTI-STATION PUSH BUTTON SWITCH.
Interim development rept. for 1 Jan-31 Mar 65.
16 Apr 65, 14p
Contract NObs89440, Proj. SR0080302, Task 9633
Unclassified report

Available only for reference at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Electric switches, Multiple operation), Ship auxiliary equipment, Switching circuits, Miniature electrical equipment, Modules (Electronic), Design, Construction.

A two and ten station mechanical interlocked and manual release, illuminated, snap action, sealed, push-button switch assembly is being developed. Each station consists of up to six double pole miniature switch circuits, a front removable lens and lamp and unit which requires no tools to remove, and all circuitry associated with the lamp and miniature switches. A multi-station snap action switch assembly consists of two or more stations on a common frame. All stations are mechanically linked to provide the appropriate lockout, interlock and teaseproof functions. An extra momentary station shall be incorporated to provide manual release of any previously actuated station. Work was stopped about January 28, 1965 because of lack of funds. During this period all parts were fabricated and several sub-assemblies were built. Work remaining to be accomplished consists of final assembly, drafting, and testing of the finished units.

AD-614 717 Div. 7, 13
CFSTI Prices: HC$4.00 MF$1.00

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
5 KVA HYDROCARBON-AIR FUEL CELL SYSTEM.
Technical summary rept. for 11 Jun 63-15 Mar 65,
by Merle L. Engle. Mar 65, 144p
Contract DA44 009AMC240T, ARPA Order 430
Unclassified report

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Descriptors: (*Power plants (Establishments), Fuel cells), (*Fuel cells, Design), Hydrocarbons, Air, Electric power production, Inverters, Control systems, Operation, Maintenance, Specifications, Compressors, Heat exchangers, Valves, Pumps.

Principal emphasis was placed upon the overall power plant analysis and design. The three major systems, the fuel cell, reformer, and inverter, comprising the power plant are discussed. The integration of these into the total system is explained. The electrical controls, tentative operating, and maintenance procedures of the power plant are included in the report. The fuel cell system is presented with discussions of the design, function, and control of its various subsystems. The fuel cell module is analyzed as to its configuration, components, weight, and operation. Appendices are attached which give substantiative information for the total system concept in the form of calculations, equipment specifications, test reports, and manufacturers contacted. (Author)

AD-614 762 Div. 7, 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
15,000,000 LUMEN OF ELECTRIC SOLAR LIGHT,
by Yu. Medvedev. 9 Apr 65, 16p FTD-TT-64-1081
TT 65-62082
Unclassified report

Unedited rough draft trans. of Nauka i Zhizn' (USSR) v29 n3 p24-32 1962.

Descriptors: (*Lighting equipment, Plasma physics), (*Plasma physics, Lighting equipment), Light, Gas discharges, USSR.

A popularized article on the development of a plasma lighting lamp is presented.

AD-614 765 Div. 7
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FACTORS DETERMINING SPECIFIC CAPACITY OF CAPACITANCE GENERATORS,
by E. A. Lodochnikov, V. P. Luk'yanchuk and V. A. Kufa. 7 Apr 65, 13p FTD-TT-65-291
TT 65-62085
Unclassified report

Unedited rough draft trans. of Electrotekhnika (USSR) v35 n11 p8-11 1964.

Descriptors: (*Generators, Capacitance), Disks, Polarization, Performance (Engineering), Power, Voltage, Electrostatic generators, USSR.

Discussed are factors, determining energy characteristics of disk type capacitance generators of unipolar and bipolar type, belonging to the class of machines, with transporter-conductors. (Authors)

AD-614 907 Div. 7, 25
CFSTI Prices: HC$3.00 MF$0.75

Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.
A CONTINUATION OF THE BASIC STUDY OF SLENDER CHANNEL ELECTROGASDYNAMICS.
Final rept. for Feb 63-Aug 64,
by Bernard Kahn. Jan 65, 97p
Contract AF33 657 10892, Proj. 7116, Task 711602
ARL 65-4
Unclassified report

Descriptors: (*Electric power production, Plasma medium), (*Energy conversion, Plasma physics), (*Plasma medium, Energy conversion), Generators, Ions, Electric fields, Colloids, Aerosols, Particle size, Density, Test methods, Nozzles, Gas discharges, Ion sources, Gas flow.

The report covers the continuation of power generation studies involving electrogasdynamic energy conversion (See also AD-427 967). The continuation of these studies involves a detailed experimental and analytical program investigating the phenomenon of generating electric power by causing a supply of unipolar ions to be forced to flow against an opposing induced electric field in an energy conversion channel. The analytical program includes studies on the mobility of charged aerosol particles, the performance of electrogasdynamic generators, and optical

methods to determine particle size and number density in a steady flow. Experimental investigations include the measurement of mobility, the examination of the EGD interaction using colloidal ions, attempts to measure pressure drops due to friction and electrical body forces and electrical field distribution. The advantage of designing converters in which the length is considerably greater than the diameter is explored further, with the conclusion that electrical forces must act on the charged particles over a distance that remains compatible with limitations due to electrical breakdown and particle deposition. (Author)

AD-614 941 Div. 7
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CLASSIFICATION OF CONTACTLESS SYNCHRONOUS MACHINES,
by V. V. Apsit. 30 Apr 65, 27p FTD-TT-65-118
TT 65-62130

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Latviiskoi SSR, Riga. Institut Energetiki. Trudy v12 p23-48 1961.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Machines, Synchros), (*Synchros, Classification), (*Electrical equipment, Synchros), Induction motors, Generators, Electrical engineering, USSR.

A brief description is presented of contactless synchronous machines which are classified as: Radial alternatives, axial alternatives, radial pulsating and axial pulsating.

AD-615 079 Div. 7
CFSTI Prices: HC$2.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
INVESTIGATIONS ON LIQUID AMMONIA CELLS,
by Achille L. Almerini. Jan 65, 32p
Technical rept. ECOM-2562
Proj. 1C6 22001A053, Tasks 1C6 22001A053, 1C6 22001A053 26

Unclassified report

Descriptors: (*Ammonia, Electrolytic cells), (*Electrolytic cells, Ammonia), (*Cathodes (Electrolytic cell), Silver compounds), (*Salts, Electrolytic cells), Chlorides, Manufacturing methods, Magnesium, Electrolytes, Potassium compounds, Perchlorates, Thiocyanates, Mixtures, Primary cells.

A number of investigations were performed on Mg-liquid NH3-AgCl cells to evaluate and optimize a new technique (hot dry press) for forming AgCl cathodes and also to demonstrate feasibility of a mixed salt electrolyte (KSCN:KClO4 in liquid ammonia). The hot dry pressed AgCl cathode appeared to be as efficient as the conventionally water pasted cathode and showed greater ease in fabrication, shorter fabrication time and better adaptability for higher weight electrodes. The mixed salt electrolyte 35:10 KSCN:KClO4 increased the energy output of the Mg-AgCl system by 20% at -65F, while reducing the vapor pressure of the previously used 35% KSCN by 50 psi at +125F. The factorial design plans used are discussed in detail, with emphasis on planning, evaluation of results and use of significant factor level ranges in subsequent experiments. (Author)

AD-615 099 Div. 7, 30

Illinois Univ., Urbana. Engineering Experiment Station.
LINEAR NETWORK ANALYSIS AND REALIZATION DIGITAL COMPUTER PROGRAMS: AN INSTRUCTION MANUAL,
by D. A. Calahan. Feb 65, 44p
Bulletin no. Bull-472
Grant AF AFOSR177 63

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale by CFSTI; available from Univ. of Illinois Engineering Publications Office, Urbana, as University of Illinois Bulletin 472, $10.00.

Descriptors: (*Networks, Synthesis), (*Digital computers, Data processing systems), (*Electrical engineering, Data processing systems), (*Data processing systems, Electrical engineering), Topology, Electrical equipment, Electrical properties, Programming (Computers), Instruction manuals.

Digital computer FORTRAN programs for the analysis and realization of linear electrical networks are described, and ten examples of their use are given. For input data, the analysis program requires a list of elements (described by their terminal node numbers, element types, and elemental values), the input and output node numbers, and the type of desired network function (driving point impedance, voltage transfer function, etc.). The program then calculates the coefficients of the required network function, the poles and zeros, frequency response, and transient response to an arbitrary input. The realization program requires for input data an existing design (topology) which is in some sense close to its final form. The element values are then perturbed until the final design (if possible) is achieved. The final design is specified by prescribing element values and/or a network function T(S). The principal features of the realization program are its abilities to accept arbitrary topologies, to 'grow' new elements, and to converge rapidly. (Author)

AD-615 114 Div. 7
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
A PRELIMINARY STUDY OF FACTORS AFFECTING MAGNESIUM DRY CELL PERFORMANCE CHARACTERISTICS,
by Donald B. Wood. Feb 65, 23p
Technical rept. no. ECOM-2561
Proj. 1C6 22001A053, Task 1C6 22001A053 02

Unclassified report

Descriptors: (*Dry cells, Performance (Engineering)), (*Primary cells, Performance (Engineering)), Magnesium, Electrolytes, Magnesium compounds, Perchlorates, Chlorides, Bromides, Lithium compounds, Anodes (Electrolytic cell), Coatings, Magnesium alloys, Aluminum alloys, Zinc alloys, Radio equipment, Power supplies.

Preliminary investigations were carried out to determine the cell parameters that influence the 'delayed action' of 'N' size magnesium dry cells when subjected to the duty cycle and drain rate encountered in the AN/PRT-4 radio set. High concentrations (5N) of magnesium perchlorate electrolyte, protective films such as Cramolin, applied to the anode, and low concentrations of chromate ion were found to be beneficial in reducing the delayed

action characteristic of the magnesium dry cell, but had a deleterious influence on the service capacity of the cell. Cells incorporating more active electrolytes such as MgCl2, LiCl and MgBr2 and various mixed perchlorates and mixed bromides were evaluated. None of these electrolytes resulted in cells that performed better than cells incorporating magnesium perchlorate electrolyte when both delayed action and service capacity were considered. There is little difference between cells made with AZ10 alloy cans and AZ21 cans with regard to service and delayed action characteristics. (Author)

AD-615 115 Div. 7
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
UNSYMMETRICAL LOW-VOLTAGE CONVERTER,
by William L. Dudley. Jan 65, 21p
Rept. no. ECOM-2574
Proj. 1C6 22001A053 05, Task 1C6 22001A053 05
Unclassified report

Descriptors: (*Voltage amplifiers, Transitor amplifiers), (*Power supplies, Voltage amplifiers), Voltage, Oscillators, Energy conversion, Feedback amplifiers, Power transformers, Switching circuits, Circuits, Direct current.

The theory of converting the low output voltages generated by energy conversion devices to useful higher voltages by means of an unsymmetrical electrical converter is discussed. The design and development of an experimental converter are described. Performance characteristics of the converter are interpreted in relation to feasibility of the concept. (Author)

AD-615 160 Div. 7
CFSTI Prices: HC$3.00 MF$0.75

Union Carbide Corp., Parma, Ohio.
THIN FUEL CELL ELECTRODES.
Final rept. for 1 Jun 63-31 May 64,
by M. B. Clark, W. G. Darland, G. E. Evans, and K. V. Kordesch. 31 May 64, 81p Rept. no. R-4
Contract DA36 039AMC02314E,
Proj. 1C6 22001A053, Task 1C6 22001A053 04
Unclassified report

See also AD-600 951.

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Fuel cells), (*Batteries and components, Fuel cells), Nickel, Carbon, Bases (Chemistry), Carbonates, Hydrogen, Diffusion, Gases, Porous metals, Sintering, Fibers, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Electrolytes, Carbon dioxide, Factor analysis, Tests, Life expectancy, Porous metals.

Data have been collected which shown that the features of metal and carbon electrodes can be combined in so-called 'fixed-zone' electrodes, and manufactured by layering a porous nickel backing with an active carbon material which contains the catalyst. Commercially available sintered-nickel plaques usable for electrode backing were physically characterized, and carbon materials suitable as electrode base materials were screened in respect to their properties and electrochemically evaluated. Manufacturing procedures have been devised and refined to a point at which output, operational life, and reproducibility are sufficiently high to permit determination of performance characteristics in an extensive testing program. The partial factorial matrix set up to evaluate the influence of processing variables on polarization of electrodes and cell life revealed the relative importance of closely controlled electrode production steps. Long-time testing of larger (6-by 5-in.) cells and cell combinations established the longevity of the fixed-zone electrode type under practical operating conditions over many thousands of hours at reasonable current densities (30 and 50 ma/sq cm). Performance of thin electrodes in various KOH and NaOH electrolyte concentrations, in carbonate-containing caustic solutions and with immobilized electrolytes was investigated. The effect of gas pressure was studied and operation at below freezing temperatures was recorded. (Author)

8. Electronics and Electronic Equipment

AD-614 569 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

General Electric Co., Schenectady, N. Y.
SUPERPOWER MILLIMETER WAVE TUBE.
Rept. no. 13 (final), 15 Oct 63-15 Nov 64,
by H. L. Thal and R. G. Lock. 15 Nov 64, 98p
Contract DA36 039AMC03409E,
Proj. 1P6 22 001A055 04 12

Unclassified report

Continuation of Contracts DA36 039AMC00031E, DA36 039sc88960.

Descriptors: (*Magnetrons, Millimeter waves), (*Millimeter waves, Magnetrons), Oscillators, Microwave equipment, Waveguides, Waveguide circulators, X band, Wiring diagrams.

Experiments were performed on the frequency locking of magnetrons using both reciprocal (special waveguide tee junctions) and non-reciprocal (circulators) coupling techniques. The results presented include the locking of a single magnetron having a second-order output circuit with circulator coupling and a three-tube array with reciprocal coupling that gave a 15-decibel gain and 600-kilowatt output at X-band. Packaged magnetrons were used in these experiments without any modifications, and thus the results are intended to demonstrate the principles involved without implying that they represent optimized performance. An equivalent-circuit model whose parameters were experimentally determined is presented. The good quantitative agreement between the performance predicted by the model and all of the experimental results is shown. Multimagnetron arrays were designed by an active filter theory. Computer programs were developed for predicting the matched and mismatched load performance and the self-oscillating modes of these arrays. In addition to the arrays actually built and tested, other arrays were designed and evaluated on the computer to demonstrate some significant aspects of magnetron locking. (Author)

AD-614 573 Div. 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Microwave Associates, Inc., Burlington, Mass.
HIGH POWER SEMICONDUCTOR TR DEVICES.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 64,
by R. H. Brunton, III, 31 Dec 64, 41p
Contract DA36 039AMC03187E,
Proj. 1P6 22001A056

Unclassified report

Descriptors: (*Transmitter-receivers, Semiconductor devices), (*Semiconductor devices, Transmitter-receivers), (*Electronic switches, Diodes (Semiconductor)), Limiters, X band, K band, Radiofrequency power, Varactor diodes, Performance (Engineering), Microwave equipment.

The report covers work performed on both X sub L-band and K sub U-band phases. The effort on the contract has resulted in the delivery of K sub u band and S sub L band experimental models. These units were delivered according to contract specifications. Complete electrical data at high power and low level are given. Additional results are given for investigations of diodes and improved designs in both the K sub u and X sub L bands. (Author)

AD-614 580 Div. 8, 1, 26
CFSTI Prices: HC$2.00 MF$0.50

Naval Air Development Center, Johnsville, Pa.
Aeronautical Electronic and Electrical Lab.
DEVELOPMENT OF PROPOSED MILITARY SPECIFICATION FOR THERMAL DESIGN PROCEDURES FOR AVIONICS SYSTEMS.
Phase rept.,
by A. R. Saltzman and B. T. Plizak. 22 Mar 65, 48p
Rept. no. NADC-EL-6506
Task RAV03J002 2021R008 03 01

Unclassified report

Descriptors: (*Aircraft equipment, Electronic equipment), (*Electronic equipment, Airborne), (*Temperature control, Specifications), Air conditioning equipment, Cooling and ventilating equipment, Military requirements, Design, Test methods, Standards, Manufacturing methods, Reliability.

Progress made in the development of a proposed military specification for the thermal design procedures for avionics systems is presented. The specification defines the elements of an avionics system, the two major categories of electronic equipment cooling, and the cooling methods falling under each category. It covers the requirements for (a) major phases of the technical development process, (b) coordination between the various contractors and subcontractors, (c) analyses, (d) testing and evaluation, (e) data and data presentation, and (f) reporting. (Author)

AD-614 583 Div. 8, 26
CFSTI Prices: HC$2.00 MF$0.50

Bliley Electric Co., Erie, Pa.
PRODUCTION ENGINEERING MEASURE. CR-(XM-53)/U QUARTZ CRYSTAL UNITS.
Quarterly progress rept. no. 1, Nov 64-Jan 65,
by J. M. Wolfskill, M. George, and R. Mouck. Jan 65, 35p
Contract DA36 039AMC03640E

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Quartz resonators, Manufacturing methods), Single sideband communication systems, Reliability (Electronics), Life expectancy, Tests, Wiring diagrams, Specifications, Mechanical drawings, Crystal holders.

The report reviews the initial period of the combined PEM and Reliability Study of CR-(XM-53)/U quartz crystal units. These units, mounted in glass HC-27 holders, are high-precision crystals in the 1-Mc to 5-Mc frequency range. Intended primarily for use in single-sideband equipment, these high-Q, low-power crystal units are expected to attain a failure rate of only 1% per thousand hours; compliance with this goal-requirement is to be demonstrated by a 6-month test of 1000 units. The first report period has seen the establishment of designs for those units at frequencies of two megacycles and above. Preliminary evaluation indicated that these designs are well suited to the CR-(XM-53)/U requirements. An experimental design for the 1-megacycle units has also been derived, but has not yet been evaluated because the special components needed for assembly have not yet been delivered. (Author)

AD-614 584 Div. 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Electro-Optical Systems, Inc., Pasadena, Calif.

MOLECULAR TUNABLE AMPLIFIERS.
Interim scientific rept. no. 2, 1 Jul-30 Sep 60,
by M. Chester and J. Winslow. 15 Oct 60,
38p Rept. no. EOS-440-Q-2
Contract AF33 616 7247

Unclassified report

Descriptors: (*Molecular electronics, Amplifiers), (*Semiconductor devices, Amplifiers), (*Amplifiers, Molecular electronics), (*Delay lines, Amplifiers), Germanium, Silicon, Electric currents, Quantum mechanics, Infrared equipment, Spectrum analyzers.

The contract effort is directed to research and development on a solid state tunable amplifier contained in a single crystal structure without employment of conventional electronic components. Semiconductor germanium delay lines were made and tested. Analysis suggests that optimum delay line amplifiers can be made in p-type silicon and p-type germanium and these devices will be examined during the next contract period. Conclusions drawn from the work indicate maximum usefulness for the delay line amplifier in frequency range from 50 kcps to 150 kcps. It is interesting to note that the delay line amplifier makes direct use of the minority carrier delay phenomena in a semiconductor for tuning rather than miniaturization of a traditional RC time constant circuit. The success of the stimulated emission amplifier (SEASER) cannot be predicted until fundamental excitation lifetimes are measured experimentally as discussed in the report. (Author)

AD-614 589 Div. 8, 30
CFSTI Prices: HC$7.00 MF$1.75

IIT Research Inst., Chicago, Ill.
PROCEEDINGS OF THE ANNUAL JOINT MILITARY-INDUSTRIAL ELECTRONIC TEST EQUIPMENT SYMPOSIUM (4th), HELD AT THE MUSEUM OF SCIENCE AND INDUSTRY, CHICAGO, ILLINOIS SEPTEMBER 14 AND 15, 1960,
15 Sep 60, 325p

Unclassified report

Sponsored by Office of the Director of Defense Research and Engineering and the Department of the Army Signal Corps.

Descriptors: (*Test equipment (Electronics), Symposia), (*Symposia, Test equipment (Electronics)), (*Measuring devices (Electrical and Electronic), Test equipment (Electronics)), (*Armed forces research, Test equipment (Electronics)), Industrial research, Wattmeters, Hall effect, Noise analyzers, Microwave equipment, Failure (Mechanics), Malfunctions, Life expectancy, Monitors, Systems engineering.

The symposium was presented to emphasize the advanced instrumentation techniques currently being developed to keep pace with expanding system requirements. The technical sessions were planned to be sufficiently diversified, both at the practical and more technical levels, in order to stimulate the exchange of information among the individuals present. Industrial and government representatives attended a total of seventeen technical presentations in addition to a luncheon address. The technical sessions presented such general topics as voltage and power measurements, microwave measurement techniques, systems measurements, and fault analysis. Specific papers provided technical data on a variety of instruments, measurement techniques, and analytical approaches to measurement problems.

AD-614 592 Div. 8, 17
CFSTI Prices: HC$3.00 MF$0.75

Thermo Electron Engineering Corp., Waltham, Mass.

THERMIONIC EMITTER MATERIALS RESEARCH PROGRAM.
Final technical summary rept. for 1 Oct 63-30 Nov 64,
by S. S. Kitrilakis, J. H. Weinstein, and B. Gunther.
30 Nov 64, 93p Rept. no. TE74-65
Contract Nonr356300

Unclassified report

See also AD-299 431.

Descriptors: (*Thermionic emission, Materials), (*Thermionic converters, Rhenium), (*Rhenium, Thermionic converters), (*Niobium, Thermionic converters), Work functions, Energy conversion, Molybdenum, Test equipment, Performance (Engineering), Electric currents, Voltage, Surface properties, Cesium.

The accomplishments during the first and second years of the three-year Thermionic Materials Research Program are summarized. The development of an advanced test vehicle using a collector guard ring and other improvements is described. Collector work function data obtained with a niobium collector and a rhenium collector are described and analyzed. The results are compared with earlier results of molybdenum collectors. Power output data using each of the collector materials were also taken and analyzed. Again a comparison was made between power output from similar emitters opposite rhenium, niobium and molybdenum collectors. It is concluded that no significant difference in optimum converter performance resulted from the difference in collector material. The relationship between collector work function and converter performance is shown to be more complex than previously predicted, and further study is recommended to determine the actual relationship. Earlier work on electron colling and interelectrode radiation values is confirmed using the guarded collector test vehicle. (Author)

AD-614 599 Div. 8, 26
CFSTI Prices: HC$3.00 MF$0.75

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES (PEM) FOR MICROELECTRONIC CIRCUITRY AND MILLIWATT LOGIC SEMICONDUCTOR INTEGRATED CIRCUITS.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 64.
30 Sep 64, 56p Rept. no. TI-03-64-76
Contract DA36 039AMC03637E

Unclassified report

Descriptors: (*Microminiaturization (Electronic), Integrated circuits), (*Circuits, Microminiaturization (Electronics)), (*Integrated circuits, Computer logic), Manufacturing methods, Semiconductor devices, Gates (Circuits), Relaxation oscillators, Propagation, Delay circuits, Design, Processing, Transistors.

Work accomplished during the reporting period was directed toward improvement of the microelectronic circuits presented in this report and evaluation of circuits developed. Bar layouts are being processed for the circuits and data from the evaluation of circuits are being considered for approach possibilities. Activities on milliwatt logic semiconductor integrated circuits were directed toward providing equipment, and design for environmental test facilities. Cost reduction through larger wafers and better probes for thorough testing prior to packaging constituted a major project effort. (Author)

AD-614 600 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
AN EVALUATION OF AN IMPORTANT ADVANCE IN

NETWORK SYNTHESIS THEORY.
Physical Sciences Research Papers,
by E. Folke Bolinder. Mar 65, 29p
Paper no. PSRP-85, AFCRL 65-172
Proj. 5635, Task 5635 01

Unclassified report

Descriptors: (*Electrical networks, Synthesis), (*Microwave networks, Reviews), Theory, Resistance (Electrical), Inductance, Capacitance, Circuits.

A discussion of a recent significant advance in network synthesis theory is presented. This 'breakthrough' was accomplished by D. Hazony of the Case Institute of Technology and by D. C. Youla of the Polytechnic Institute of Brooklyn, who independently of each other developed methods for unifying the theory of two-port cascade synthesis. Both methods are based on Richards' theorem, and both introduce the gyrator artificually. Different methods of proof are used, however. A valuable 'cookbook recipe' was developed by Youla. Hazony managed to extend the method to n-ports. In all, this epoch-making achievement has resulted in an important, simple, and beautiful method of network synthesis. (Author)

AD-614 604 Div. 8, 26

Westinghouse Electric Corp., Elkridge, Md.
PRODUCTION ENGINEERING MEASURE: IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY OF SILICON PLANAR EPITAXIAL DEVICES; SILICON PLANAR EPITAXIAL TRANSISTOR (WX-4001); MICROELECTRONIC MONOLITHIC CATEGORY: DUAL NAND LOGIC GATE (WM-201Q), R-S FLIP FLOP (WM-202Q), PULSE BINARY (WM-213Q).
Final rept. for 1 Jul 63-9 Apr 65,
by A. T. Hamill. 9 Apr 65, 493p
Contract DA36 039AMC03617E

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale. See also AD-612 756.

Descriptors: (*Transistors, Manufacturing methods), (*Integrated circuits, Microminiaturization (Electronics)), Silicon, Epitaxial growth, Computer logic, Switching circuits, Diffusion, Photochemistry, Processing, Encapsulation, Reliability (Electronic), Failure (Mechanics), Life expectancy, Storage.

Production techniques in the areas of diffusion, photochemistry, assembly, encapsulation and design were improved. The most significant improvement in reliability resulted from elimination of pinholes in the passivating oxide layer. Temperature was confirmed to be the stress most useful in accelerating failures for reliability analysis and prediction. Temperature combined with electric field ('operating life') provides additional insight into device behavior. Extensive failure analysis was performed, and several useful failure analysis techniques were evolved. The improved devices exhibited a high order of stability in the storage and operating life tests at temperatures up to 225 C. Extrapolation of the temperature analysis of the drift of output cutoff current of the WM 201Q at 125 C and 25 C enabled a prediction of a failure rate of less than .01% per 1000 hours at 25 C for the logic blocks. A unique treatment of the failure data from all high temperature tests permitted another calculation of failure rate, again demonstrating a failure rate well below the contract objective. (Author)

AD-614 607 Div. 8
CFSTI Prices: HC$4.00 MF$1.00

Air Force Cambridge Research Labs., Bedford, Mass.
THE PERFECTLY COUPLED AND SHUNT-AUGMENTED T TWO-PORT.
Physical sciences research papers,
by Kurt H. Haase. Apr 65, 123p
PSRP-90, AFCRL 65-215
Proj. 5628, Task 5528 06

Unclassified report

See also AD-423 616.

Descriptors: (*Electrical networks, Theory), Electrical impedance, Impedance matching, Resistance (Electrical), Capacitance, Inductance, Transformers, Coupling circuits, Equations.

A new two-port structure, referred to as a 'Perfectly Coupled and Shunt-Augmented T', is defined and its properties are described. The classical Brune two-port can be recognized as a particular example of this general class of two-ports. There are three feasible types (A, B, and C) of perfectly coupled and shunt-augmented T's. A tandem of two matched T's of type AC or BC is equivalent to a lattice two-port. Suitable impedances can be transposed from one port to the other over the T whereby only the magnitudes of its elements are changed. The dual of this T is the 'Perfectly Coupled and Series-Augmented Pi'. The discussion of these new kinds of two-ports is supplemented by ten numerical examples. (Author)

AD-614 611 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

National Co., Inc., Melrose, Mass.
PRODUCTION ENGINEERING MEASURE FOR CESIUM BEAM TUBES.
Quarterly progress rept. no. 7, 23 Nov 64-23 Feb 65,
by James George. 23 Feb 65, 31p
Contract DA36 039AMC01457

Unclassified report

See also AD-610 302.

Descriptors: (*Cesium electron tubes, Manufacturing methods), (*Electron beams, Cesium electron tubes), Performance (Engineering), Life expectancy, Electron multipliers, Ions, Processing, Quality control, Waveguides, Microwave equipment, Electron tube parts, Aluminum, Protective treatments, Electron tube heaters, Design.

The life test of the retrofitted PEM-E3 cesium beam tube was continued with satisfactory results. Problems in the area of the cesium detector, the microwave structure, the aluminum mounting structure, and the material finishes were resolved. The final PEM-E5 and PEM-E6 tubes were fabricated, assembled, processed, aligned, and tested under laboratory conditions. Lead times required for purchased components were significantly reduced. The quality assurance division began preparation of test procedures, tube specifications, and processing instructions for the manufacturing phase of the program. (Author)

AD-614 618 Div. 8, 20, 25
CFSTI Prices: HC$3.00 MF$0.75

Bendix Corp., Southfield, Mich.
EXPLORATORY DEVELOPMENT OF THE Q-FACTOR TECHNIQUE.
Quarterly progress letter no. 4 for period ending 31 Mar 65,
by Max Frank. 10 Apr 65, 63p Rept. no. 2899
Contract AF29 601 6316, Proj. 4400 Unclassified report

Descriptors: (*Transistors, Gain), (*Radiation damage, Transistors), Neutron reactions, Gamma rays, Environmental tests, Degradation, Electric currents, Mathematical prediction, Dosimeters.

Mean composite radiation damage constants, including the percent relative dispersion, are reported as a function of emitter current density for 22 different n-p-n silicon transistor types irradiated in a neutron environment of 7 x 10 to the 13th power n/sq cm, E > 0.1 Mev. A technique is described for the resolution of reciprocal gain into damage effect components in the base and space charge regions. The technique yields different damage constants for each region and results in a more accurate description of the radiation effects. Results are given for the application of this method to the 2N1613 transistor. A discussion is included of the determination of transistor physical parameters required for prediction of radiation damage, using the Boothroyd-Trofimenkoff model with data derived for the 2N1613 transistor. Results are shown from an isochronal annealing experiment performed on two pairs of 2N1613 transistors, one pair previously irradiated in neutrons and the other in a Cobalt 60 environments, each pair consisting of an actively and a passively irradiated unit. (Author)

AD-614 619 Div. 8, 2
CFSTI Prices: HC$2.00 MF$0.50

Rhode Island Univ., Kingston.
LABORATORY MODEL OF THE EARTH-IONOSPHERE CAVITY.
Final rept., part 2, 15 Jun 60-14 Jan 65,
by I. P. Yu, R. James, and C. Polk. 15 Mar 65,
49p Scientific rept. no. SR-4, 7252/4
Contract AF19 604 7252, Proj. 4603, Task 460313
AFCRL 65-200 II

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Ionospheric propagation, Atmosphere models), (*Atmosphere models, Ionospheric propagation), (*Cavity resonators, Atmosphere models), Electromagnetic waves, Extremely low frequency, Electrical conductance, Dielectric properties, Electromagnetism, Scale, Model theory.

The theory of electromagnetic scaling is outlined for media in which the scalar electric conductivity and dielectric permittivity are either constants or functions of position. This theory is applied to the construction of a scale model of the earth-isotropic ionosphere cavity. Construction of the cavity is described. Effects upon field distribution due to eccentricity between the two shells in a perfectly conducting resonator of the earth-ionosphere dimensions are considered; it is found that correction terms due to eccentricity have a magnitude not greater than approximately one per cent of the unpeturbed fields everywhere except in those regions where the unperturbed fields approach zero. (Author)

AD-614 624 Div. 8, 25, 26

RCA Defense Electronic Products, Camden, N. J.
PRODUCTION ENGINEERING MEASURE. MICROELEMENT TRANSISTORS.
Formal engineering rept.
Feb 65, 262p
Contract DA36 039SC75968, Task 31

Unclassified report

Rept. on Micromodule Program Extension II.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is not available for public sale.
See also AD-610 191.

Descriptors: (*Transistors, Manufacturing methods), (*Subminiature electronic equipment, Manufacturing methods), (*Packaging, Subminiature electronic equipment), Microminiaturization (Electronics), Transistors, Diodes (Semiconductor), Semiconductors, Cleaning, Ultrasonic radiation, Germanium, Silicon, Reliability (Electronics), Environmental tests, Life expectancy, Encapsulation, Hermetic seals, Performance (Engineering), Miniature electronic equipment.

The purpose of this task was to establish a manufacturing capability for a broad line of microelement transistors commensurate with Micromodule Program requirements. Subcontractors were established to provide devices that could be hermetically packaged and mounted on a micromodule wafer. These devices were to have met the micromodule processing and environmental requirements. Detail transistor specifications were developed based on the devices resulting from this task effort.

AD-614 644 Div. 8, 25, 26
CFSTI Prices: HC$1.00 MF$0.50

Sperry Microwave Electronics Co., Clearwater, Fla.
PRODUCTION ENGINEERING MEASURE YIG SPHERES AND LIMITERS.
Quarterly progress rept. no. 6, 29 Aug-29 Nov 64,
by J. E. Andrews, L. R. Hodges, Jr., and D. E. Tribby. 29 Nov 64, 23p Rept. no. SJ222-0045-6
Contract DA36 039AMC01477E

Unclassified report

See also AD-609 661.

Descriptors: (*Ferroelectric crystals, Manufacturing methods), (*Limiters, Manufacturing methods), (*Spheres, Single crystals), (*Single crystals, Crystal growth), Polishes, Surface properties, Yttrium, Iron, Garnet, Encapsulation, Gallium, Temperature, L-band.

The yield and quality of spheres have been enhanced by a rearrangement of sphere forming and polishing equipment and by implementing a new sphere handling technique. The temperature stability study has established the material basic characteristic necessary for L-band operation at -55 degrees C, and revealed parameters responsible for the temperature instability. Preliminary preproduction testing on limiters in all bands has been completed and units are ready for final tests. Three batches of pure YIG and six batches of substituted YIG material were fired and evaluated. A new process, consisting of adding presintered garnet power in place of the yttrium and iron oxides, was used to obtain better mixing of the single crystal ingredients. (Author)

AD-614 648 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
CESIUM VAPOR CATHODE STUDY.
Final rept. for 2 Dec 63-30 Nov 64,
by A. E. Eichenbaum, F. H. Norman, H. Sobol, and S. Bloom. Apr 65, 60p
Contract AF30 602 3241, Proj. 5573, Task 557303
RADC TR-65-2

Unclassified report

See also AD-608 920.

Descriptors: (*Cesium electron tubes, Cathodes (Electron tubes)), (*Cathodes (Electron tubes),

Cesium), Plasma medium, Electron beams, Vapors, Electron guns, Silver compounds, Chlorides, Gas seals, Voltage, Mathematical analysis.

Cesium-plasma cathodes have been studied as sources of very high-density electron beams. The common-emitter type of cathode using a highly directed cesium-vapor flow has been used to obtain a beam with a density of 800 A/sq cm. The beam was accelerated to 1.2kV without any occurrence of voltage breakdown or instabilities. The electron temperature is of the order of only twice the cathode temperature. A continuous current of 7 A has been extracted from a common-emitter cathode. It was possible to extract all emitted electrons from all common-emitter tubes tested. The separate-emitter type of tube with properly activated cathodes and directed vapor flow should provide beams with densities of 100 A/sq cm. Calculations have been made describing the stability and electron extraction from effusing, synthesized plasmas. Comparisons of theoretical and measured results are in fair agreement. A silver chloride seal has been shown to be a long-life seal for a tube using hot cesium vapor. (Author)

AD-614 649 Div. 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Microwave Associates, Inc., Burlington, Mass.
APPLICATION OF SEMI-CONDUCTOR DEVICES TO HIGH POWER DUPLEXERS.
Quarterly rept. no. 3, 1 Oct-31 Dec 64,
by Daniel Conlon. Mar 65, 40p
Contract AF30 602 3278, Proj. 5573, Task 557304
RADC TR-65-52
Unclassified report

See also AD-611 285.

Descriptors: (*Semiconductor devices, Radar duplexers), (*Radar duplexers, Semiconductor devices), (*Switching circuits, Diodes (Semiconductor), Phase shifters, Phase shift, Radiofrequency power, C-band, Transmitter-receivers, Temperature.

The work performed was circuit analysis and power handling capability of PIN diodes for use in C-Band. The 'T' model phase shifter provided the largest phase shift per diode, but was capable of duplexing less than one tenth the required power level. The 'B' model phase shifter did not provide enough phase shift to be of use as a duplexer. The 'W' and 'H' model phase shifters require high power tests before evaluation can be performed. The TR type switch shows some signs of promise. Diode junction temperature tests were performed. (Author)

AD-614 650 Div. 8, 15
CFSTI Prices: HC$3.00 MF$0.75

Polytechnic Inst. of Brooklyn, N. Y.
A NETWORK APPROACH TO THE DESIGN OF MULTI-LINE 2N PORT DIRECTIONAL COUPLERS,
by Edward Ott. Apr 65, 56p PIBMRI-1236-64
Contract AF30 602 2868, Proj. 8505, Task 850501
RADC TR-65-41
Unclassified report

Descriptors: (*Coupling circuits, Transmission lines), (*Networks, Transmission lines), Electrical impedance, Matrix algebra, S-matrix, Field theory, Waveguide couplers, Capacitance.

Four port directional couplers which utilize coupled transmission lines have been studied by various investigators. The possibility is investigated of generalizing the four port result to achieve a 2n-port directional coupler. The viewpoint is essentially different from that used by previous investigators in that a networks approach is used throughout. The transfer impedance matrix of n+1 coupled lines is derived. Then the concept of a scattering matrix normalized to complex port impedances is introduced and the transfer scattering matrix of the coupled line system is found. Due to certain convenient properties of the scattering formalism it is possible to simply demonstrate that any system of n+1 coupled transmission lines is a potential 2n-port directional coupler. Equations for the terminating impedances which make the coupled line system act as a directional coupler are derived. The sensitivity of the device to a small change in these terminations is investigated. Also, the results of tests made on an experimental 6-port directional coupler are presented. (Author)

AD-614 676 Div. 8, 25
CFSTI Prices: HC$4.00 MF$1.00

Syracuse Univ., N. Y. Coll. of Engineering.
HETEROJUNCTION DEVICES.
Final rept., 1 May 63-30 Nov 64,
by R. L. Anderson, G. Zeidenbergs, S. Yawata, J. Rock, and D. Boyce. Mar 65, 129p
Contract AF30 602 3059, Proj. 5578, Task 557804
RADC TR-64-560
Unclassified report

Descriptors: (*Semiconductor devices, Crystal lattices), (*Semiconductors, Composite materials), Germanium, Gallium alloys, Arsenic alloys, Intermetallic compounds, Silicon, Diodes (Semiconductor), Electrical properties, Photoconductivity, Probes (Electromagnetic), Transistors.

The opto-electric characteristics of abrupt Ge-GaAs heterojunctions have been investigated to determine if such devices are efficient photon detectors. Because of a notch in the band edge at the interface the quantum efficiency is low. Further, such a device as the collector in an optical transistor is concluded to be impractical. A method of determining the minority carrier lifetime in the Ge adjacent to the GaAs, from the photocurrent spectrum, is developed. Near the band gap of Ge, the photocurrent spectrum exhibits changes in slope attributable to the onset of phonon assisted absorption. An efficient photodetector is described which utilizes a Ge-Si n-n heterojunction. A qualitative theory for this is developed. Photo-excited holes are trapped in the notch in the valence band which in turn modulates the diode current. Attempts to fabricate a wide band gap transistor have been unsuccessful. It was determined that a poor injection efficiency resulting from a predominance of recombination current in the GaAs is at fault. An apparatus for probing semiconductor devices is described. The thermoelectric and photovoltaic methods are used. (Author)

AD-614 705 Div. 8
CFSTI Prices: HC$6.00 MF$1.25

Cooley Electronics Lab., Univ. of Michigan, Ann Arbor.
ADAPTIVE REALIZATIONS OF OPTIMUM DETECTORS FOR SYNCHRONOUS AND SPORADIC RECURRENT SIGNALS IN NOISE.
Summary for 1963-65,
by Loren W. Nolte. Mar 1965, 210p
Technical rept. no. TR-163, 03674-6-T
Contract Nonr122436, Proj. NR187 200
Unclassified report

Descriptors: (*Electromagnetic waves, Modulators), (*Signals, Demodulation), (*Demodulation, Signals), Communication theory, Adaptive communication systems,

Signal-to-noise ratio, Noise (Radar), Transmitter-receivers, Optimization, Time, Theory, Equations.

The extension of the theory of signal detectability to include optimum signal processing of a recurrence phenomenon in noise is presented. This phenomenon is a fixed waveform, initially uncertain but learnable, that recurs randomly in time. The fixed waveform is uncertain in the sense that it is selected from a finite class of possible waveforms. Three basic types of recurrence time uncertainties are considered: (1) Sporadic-Poisson, (2) Synchronous-Poisson, and (3) Periodic. The Sporadic-Poisson is the most uncertain and the Periodic the least uncertain time structure. Several realizations of the optimum receiver are presented for each of the three basic recurrence time uncertainties. In order to obtain a receiver design with a practical memory size, a basic technique is presented in which the signal ensemble is described indirectly in terms of the fixed waveform and the time structure. The receiver design is obtained by realizing the likelihood ratio in a sequential manner rather than by postulating a sequential learning model per se. The effect on detectability of the uncertainty in arrival times of the fixed waveform is investigated by evaluating the detection performance in terms of the receiver operating characteristic. The performance results show the substantial effects that uncertain arrival times can have on detectability. (Author)

AD-614 757 Div. 8, 30

Ottawa Univ. (Ontario).
THE MULTIPURPOSE INTEGRATED ELECTRONIC PROCESSOR.
Revised ed.,
by G. S. Glinski, T. J. Mousseau, and W. R. Samaroo.
24 Aug 64, 4p
Grants NRC A875, DRB9931 10

Unclassified report

Pub. in Proceedings of the IEEE v52 n12 p1475-8 Dec 1964. (Copies not available to DDC or Clearinghouse customers).
Revision of manuscript submitted 25 May 64.

Descriptors: (*Electronic equipment, thin films (Storage devices), (*Thin films (Storage devices), Integrated circuits), (*Integrated circuits, Thin films (Storage devices)), Electron beams, Ion beams, Microminiaturization (Electronics), Data processing systems, Machining, Material removal, Electron microscopes, Scanning, Chemical analysis, Vacuum, Vacuum apparatus, Canada.

At the University of Ottawa, a Multipurpose Integrated Electronic Processor (MIEP) is being built for basic research in integrated electronics and its related fields. When completed, the MIEP will permit controlled deposition of thin films, electron-beam micromachining, topological inspection and chemical analysis of the films. These processes will be achieved without the need of moving the substrate from one chamber to another, with the associated problems of reregistration and maintaining clean surfaces. The primary aim of the project is the fabrication of thin-film integrated circuits containing micron-sized active and passive elements. (Author)

AD-614 774 Div. 8
CFSTI Prices: HC$8.65 MF$2.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THEORY AND APPLICATION OF FERRITES AT SUPER-HIGH FREQUENCIES,
by A. L. Mikaelyan. 25 Mar 65, 564p FTD-MT-64-396 TT 65-62094

Unclassified report

Edited machine trans. of mono. Teoriya i Primenenie Ferritov na Sverkhvysokikh Chastotakh, Moscow, 1963, 663p.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Ferrites, Microwave equipment), (*Ferromagnetic materials, Ferrites), (*Microwave equipment, Ferromagnetic materials), Magnetic properties, Superhigh frequency, Magneto-optic effect, Waveguides, Resonators, Theory, Electromagnetic waves, Propagation, Dielectric properties, Phase shifters, Electronic switches, Phase (Electronics), USSR.

Chapter 1 is dedicated to the consideration of properties of ferrites at superhigh frequencies. In the following two chapters there are investigated basic 'magneto-optical' phenomena in ferrites. At first, there is considered the case of an infinite ferrite medium (Chapter 2), and then the case of waveguides and resonators weakly filled with magnetized ferrites (Chapter 3). These two simple cases, although somewhat idealized, make it possible, without special mathematical efforts, to clarify the basic features of 'magnetooptical' phenomena in magnetized ferrites and to understand the role played in these phenomena by the waveguide. Chapter 4 is devoted to the strict theory of waveguides containing magnetized ferrites. Thus, in the first four chapters there are expounded questions of the general theory of phenomena occurring in waveguides with magnetized ferrites. Following five chapters (5-9) are dedicated to the detailed investigation of the most important phenomena which have great practical applications. Finally, in Chapter 10 there are described different ferrite devices created on the bases of the above-indicated phenomena and obtaining wide application in SHF technology. This chapter ends with the consideration of the problems of theory and design of linear ferrite SHF devices.

AD-614 776 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
CYCLOTRON WAVE DEVICES,
by Bruno Zotter. Mar 65, 21p
Technical rept. no. ECOM-2560
Proj. 1P6 22001A055, Task 1P6 22001A055 04

Unclassified report

Descriptors: (*Cyclotron waves, Microwave equipment), (*Microwave equipment, Cyclotron waves), Traveling-wave tubes, Electromagnetic waves, Electron beams, Space charges, Pumping (Electronics), Parametric amplifiers, Ultrahigh frequency, Noise (Radio), Energy conversion, Microwave amplifiers, Electromagnetic pumps, Coupling circuits.

The different types of electron beam waves are discussed and illustrated by examples of mechanical waves. The concept of positive and negative energy is introduced and its relationship to active and passive coupling investigated. The low-noise Adler tube and the diftron tube are described, as well as several possibilities of using transverse wave tubes as high-efficiency amplifiers. The use of these schemes in current microwave applications is discussed. (Author)

AD-614 786 Div. 8, 6
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., Corona, Calif.

THE IMAGE DISSECTICON. A LOW-LIGHT-LEVEL IMAGE TUBE,
by M. P. Nordseth. 1 Feb 65, 38p
Task RMGA61 070 211 1F009 03 02
NAVWEPS 8220

Unclassified report

Presented as a paper at the November 1964 meeting at the Foothill Section, Institute of Electrical and Electronic Engineers, at Corona, California.
Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Iconoscopes, Detection), (*Image orthicons, Detection), (*Detection, Image tubes), Night warfare, Light, Amplifiers, Electron optics, Design.

The image dissecticon is a multiple-readout low-light-level tube that is currently under development. To provide some technical perspective on the design problems associated with this image sensor, the theoretical relationships that limit night detection are reviewed, as well as are the principal advantages and disadvantages of two common types of image tubes, the image dissector and the image orthicon. This is followed by a discussion of the various components of the image dissecticon: an electronic variable magnifier, a microchannel image electron multiplier, a multiplying emitting electron time disperser, and a multiple-aperture readout. Of these components, the multiplying emitting electron time disperser is the unique element, which allows the image dissecticon to combine the scanning flexibility of the image dissector with the high sensitivity of the image orthicon. This component is described as a self-terminating integration process, which requires electron gain to time-disperse each input photoelectron event. (Author)

AD-614 787 Div. 8, 5
CFSTI Prices: HC$1.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ON THE MEASUREMENT OF ATMOSPHERIC MULTIPATH AND DOPPLER SPREAD BY PASSIVE MEANS,
by Barney Reiffen. 5 Mar 65, 21p
Technical note no. TN-1965-6
Contract AF19 628 500
ESD TDR-65-55

Unclassified report

Descriptors: (*Multipath transmission, Models (Simulation)), (*Doppler effect, Models (Simulations)), (*Communication theory, Radio transmission), Communication satellites (Active), Communication satellites (Passive), Microwave relay systems, Atmospheric refraction, Measurement, Filters (Electromagnetic wave), Correlation techniques, Noise (Radio).

The literature contains several procedures for the measurement of multipath and Doppler spread characteristics of a linear time-varying filter. These procedures imply processing which has access to the input waveform. For satellite communications applications, there is interest in determining the multipath and Doppler spread introduced by the atmosphere at microwave frequencies. A method is proposed in this report which permits determination of these properties without the need for launching a satellite to be used as a signal scatterer or generator. The sun or the moon is used as a source of power. An autocorrelation technique is shown to yield an estimate of the channel multipath; a dual procedure is shown to yield an estimate of Doppler spread. The effect of the receiver's front-end noise and filter is considered. Various unanswered questions are raised. (Author)

AD-614 799 Div. 8, 26

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES (PEM) FOR A GERMANIUM MICROWAVE TRANSISTOR.
Quarterly progress rept. no. 2, 30 Sep-31 Dec 64, 31 Dec 64, 136p Rept. no. 03-65-09
Contract DA36 039AMC03632E, Proj. 74057

Unclassified report

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See also AD-612 617.

Descriptors: (*Transistors, Manufacturing methods), (*Microwave equipment, Transistors), (*Germanium, Transistors), Ultrahigh frequency, Environmental tests, Soldering, Shock (Mechanics), Vibration, Acceleration, Life expectancy, Electrical properties, Experimental data.

The 1.5 Gc and 3.0 Gc noise figure of planar germanium devices using the L-78A pattern is typically 4.8 db and 9.5 db, respectively. The L-78A device's (f sub T) value at low emitter currents was below expectation considering the magnitude of reduction of apparent emitter area from the parent L-78 pattern. Limited data on planar L-78A devices using a modified emitter alloying process showed an f sub T increase at 2.0 ma from 1700 mc to 1950 mc. Additional material is being processed using the new emitter alloying process to verify the reproducibility of the technique. Problems encountered during the latter part of the second quarter in material processing have hampered efforts directed toward device improvement and technique reproducibility. A new pattern -- designed L-93A -- in comparison with the L-78A, features a smaller emitter, closer spacing between the emitter and base stripes, reduced base diffusion area, and smaller expanded contacts. Preliminary data have been obtained on the contribution of the base stripe contact resistance to the total value of the extrinsic-base resistance. The generator source impedance, r sub g, for measuring noise figure of the germanium PEM device is considered. Optimum generator impedance for measuring noise figure at 1.5 Gc is computed to be approximately 83 ohms. Quality and reliability assurance data on Group B inspection of planar L-78 devices are analyzed. (Author)

AD-614 800 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
OPTIMAL MATCHING OF LINEAR TIME-VARYING NETWORKS,
by Robert John Tracey. Apr 65, 34p Rept. no. R-252
Contract DA28 043AMC00073E

Unclassified report

See also AD-429 416.

Descriptors: (*Electrical networks, Optimization), (*Calculus of variations, Electrical networks), Energy, Linear systems, Impedance matching.

The calculus of variations is used to obtain the optimal load network for a linear time-varying n-port network excited at each port by arbitrary signals. The given network is represented using a state variable description; use of a matrix of Lagrange multipliers in the variational process then leads directly to the state variable description of the adjoint matching network. The choice of anticipative or non-anticipative load networks is considered. The general result is then specialized to obtain the usual condition required for matching time-invariant networks

in the periodic steady state. Conditions which guarantee the existence of an optimal match are obtained from the second variation. Finally, the entire matching process is interpreted in terms of the lossy and lossless parts of the network response. (Author)

AD-614 803 Div. 8, 5
CFSTI Prices: HC$3.00 MF$0.50

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
ELECTRONIC EQUIPMENT INTERFERENCE CHARACTERISTICS-COMMUNICATION TYPE.
Quarterly rept. no. 7, 15 Oct 64-15 Jan 65, by William R. Free, Charles W. Stuckey, and Robert D. Trammell, Jr. 15 Jan 65, 51p
Rept. no. 28
Contract DA36 039AMC02294E, Projs. 1G6 20501D449, A678

Unclassified report

Continuation of Contract DA36 039sc87183.

Descriptors: (*Electronic equipment, Radiofrequency interference), (*Radiofrequency interference, Measurement), (*Communication equipment, Radiofrequency interference), Electromagnetic waves, Antennas, Antenna components, Impedance matching, Standing wave ratios, Army equipment, Feasibility studies, Broadband, Anechoic chambers, Design, Controlled atmospheres, Protective coverings, Absorption.

Investigations were made to extend the determination of the interference characteristics of U. S. Army communication equipment to include the near-field emission and susceptibility characteristics. The objectives of these investigations are (1) the determination of the most economical and practical means for establishing a controlled electromagnetic environment for measuring near-field radiated and susceptibility interference characteristics of electronic equipments and (2) development of measurement techniques for measuring near-field radiated and susceptibility interference characteristics of electronic equipments in the above controlled electromagnetic environment which can be correlated with 'open-field' measurements. An investigation to evaluate a measurement technique, in which the test antenna is shielded in all but the desired direction by means of a metal hood lined with absorbing material, is described. The development of a broadband balun and antenna for use in this technique is included. The fabrication of model shielded enclosures and their use in evaluating enclosure shaping factors, absorbing materials, and absorbing material placements within shielded enclosures are described. (Author)

AD-614 818 Div. 8, 30
CFSTI Prices: HC$3.00 MF$0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
LINCOLN LABORATORY ANALYSES OF PARABOLOIDAL SHELLS (LLAPS): USER'S MANUAL, by J. W. Mar, F. Y. M. Wan, and E. Shea.
16 Nov 64, 53p Lincoln Manual 60
Contract AF19 628 500
ESD TDR-64-578

Unclassified report

Descriptors: (*Parabolic antennas, Structural properties), (*Programming (Computers), Engineering), Parabolic bodies, Structural shells, Radar antennas, Deformation, Deflection, Mathematical analysis, Digital computers, Instruction manuals, Ultrahigh frequency, Tolerances (Mechanics).

The quest for more and more precise radars in the ultra-high frequency regime has imposed stringent requirements on the structural behavior of large antennas. The tolerance requirements for an antenna surface at 10,000 Mcps, for instance, are generally set at about 1/16 of the operating wavelength. At a frequency of 10,000 Mcps, this is 3/16 of a centimeter or 0.074 inch. Such a tolerance on the permissible distortions of a structure which may be a hundred feet or more in overall size, and which assumes different orientations with respect to the direction of gravity, requires an extremely high degree of sophistication in analysis, design, and construction. This user's manual will describe the capability, potentiality, and idiosyncrasies of the various LLAPS (Lincoln Laboratory Analyses of Paraboloidal Shells) computer programs which are products of the above study. These programs are all directed at the deflection problem of antennas although the force and moment resultants are also available.

AD-614 822 Div. 8, 26
CFSTI Prices: HC$3.00 MF$0.75

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES (PEM) FOR MICROELECTRONIC CIRCUITRY AND MILLIWATT LOGIC SEMICONDUCTOR INTEGRATED CIRCUITS.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 64.
31 Dec 64, 74p Rept. no. 03-65-16
Contract DA36 039AMC03637E

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-614 599.

Descriptors: (*Microminiaturization (Electronics), Integrated circuits), (*Circuits, Microminiaturization (Electronics)), (*Integrated circuits, Computer logic), Manufacturing methods, Semiconductor devices, Gates (Circuits), Delay circuits, Relaxation oscillators, Transistors, Ceramic capacitors, Resistors, Propagation.

The second quarter activities were directed toward production of samples of the standard gate, power gate, delay element and bistable multivibrator as per specifications. The standard gate and power gate were completed and are reported in detail. The delay element and bistable multivibrator are scheduled for completion on February 10 and February 15, respectively. They will be reported on in the third quarterly report. Work on milliwatt logic semiconductor integrated circuits was accomplished with respect to program boards for the testing of Group B facilities and miscellaneous work in production. Work on cost reduction continued on larger slices and mylar probe. (Author)

AD-614 823 Div. 8, 26
CFSTI Prices: HC$6.00 MF$1.50

National Semiconductor Corp., Danbury, Conn.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N328A TRANSISTOR.
Final rept. for 30 Jun 63-30 Dec 64, by R. R. Rau and R. Di Paola. 30 Dec 64, 246p
Contract DA36 039AMC01480E

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is available for public sale.
See also AD-608 583.

Descriptors: (*Transistors, Manufacturing methods), Reliability (Electronics), Production, Failure

(Mechanics), Tests, Silicon alloys, Processing, Specifications, Quality control, Life expectancy, Chemical milling, Aluminum, Vapor plating, Gas analysis, Welding, Heating, Furnaces, Industrial equipment.

A summary is given of the work performed for improving the reliability of the PNP Silicon Alloy Transistor Type 2N328A. The following processes were modified during the course of the contract: An etch wheel was introduced to more accurately control final device etching; Additional bake-out furnaces were introduced and evaluated to increase the amount of time which the units are heated after etching; A gas recirculator was introduced into the final dry line to reduce the water vapor concentration; Welding shields were introduced at two welding operations while one other process was modified; all these changes were made in order to decrease the amount of weld splash striking the active region of the transistor. Devices produced for the first month of operation of the improved manufacturing line were used for the long term reliability testing. Measurements on devices made during this period of manufacture are included. This reliability evaluation consisted of operational tests for a 1000 hours at power levels of 400, 450, and 500 milliwatts; A specification for an improved 2N328A type transistor incorporating some of the results of evaluations made during this contract is included. (Author)

AD-614 882 Div. 8

Defence Research Telecommunications Establishment, Ottawa (Ontario).
LOSSES DUE TO RAIN ON RADOMES AND ANTENNA REFLECTING SURFACES.
Revised ed.,
by B. C. Blevis. 27 Jul 64, 3p
Unclassified report

Pub. in IEEE Transactions on Antennas and Propagation vAP-13 n1 p175-6 Jan 1965 (Copies not available to DDC or Clearinghouse customers).
Revision of manuscript submitted 16 Jul 64.

Descriptors: (*Radio waves, Attenuation), (*Raindrops, Radio waves), (*Radomes, Raindrops), (*Antennas, Raindrops), Antenna feeds, Parabolic antennas, Dielectric properties, Noise (Radio), Electromagnetic wave reflections, Theory, Radio transmission.

A brief theoretical study was undertaken to determine to what extent losses due to rain falling on a radome enclosing a large parabolic reflecting antenna would be expected to impair the performance of systems operating at frequencies above 2 Gc. Effects of increases in antenna noise temperature are not considered. Losses due to water layers on perfectly reflecting surfaces were also investigated in order to determine to what extent the problem would be alleviated if no radome were present. It is appreciated that in many circumstances these considerations may not be of any major importance in determining whether or not a radome is to be used. The values of the real and imaginary parts of the complex relative dielectric constant of water obtained at a number of frequencies between 380 Mc and 35 Gc by Grant, Buchanan, and Cook have been used as the basis for calculations of the effects of rain water described.

AD-614 900 Div. 8, 25
CFSTI Prices: HC$1.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
NANOSECOND PULSES OF VERY LOW IMPEDANCE,
Instrumentation papers,
by Heinz Fischer. Apr 65, 17p
Paper no. IP-58, AFCRL 65-219
Proj. 5634, Task 5634 01 Unclassified report

Descriptors: (*Pulse generators, Transmission lines), (*Electromagnetic pulses, Pulse generators), Electrical impedance, Electric discharges, Pumping (Electronics), Diodes (Semiconductor), Lasers, Design.

Nanosecond pulses exceeding 2000 A are obtained by discharging a plated-capacitor transmission line of very low impedance thru an air gap. High repetition rates exceeding 20 kc are possible, also triggered single shots with a time jitter of less than a nanosecond. A compact model of the pulser for operating a laser diode is described. Lower pulses covering a wide current range conveniently are produced by the same geometry, using a mercury wetted contact switch. (Author)

AD-614 906 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Philco, Blue Bell, Pa. Aeronutronic Div.
NON-PLANAR ARRAY 'THINNING' STUDY.
Quarterly interim rept. no. 2, 1 Jul-15 Oct 64,
by Charles E. Clarke and Thomas J. B. Shanley.
Mar 65, 69p Rept. no. 2594-2
Contract AF30 602 3337, Proj. 4506, Task 450604
RADC TR-64-510
Unclassified report

See also AD-608 174.

Descriptors: (*Phased arrays, Radar antennas), (*Radar antennas, Phased arrays), Radar scanning, Multiple beam antennas, Antennas radiation patterns, Mathematical models, Design, Programming (Computers), Spheres, Functional analysis, Bessel functions.

An investigation was made to establish guide-lines for designing thinned, nonuniformly spaced array antennas of spherical or hemispherical configuration. The main accomplishments during this reporting period are: (a) Development of analytical expressions for the means and variances of the normally distributed quadrature components of the far field for a randomly thinned spherical array with a radius of about 60 wavelengths, using one-quarter of the sphere as an active cap. Simple, closed-form approximations are available for the main beam and close-in sidelobes; (b) preparation of programs for the general-purpose computer which will generate far-field patterns for spherical arrays thinned to any desired percentage fill and using various degrees of element directivity. Final debugging of these programs is nearing completion; (c) progress toward the development of analytical expressions, valid for any angle theta sub p off the main-beam axis, for the means and variances of the far field as functions of theta sub p and progress toward a valid analytical technique for estimating the probability that no sidelobe in a prescribed range of theta sub p exceeds a specified level; (d) a start on the evolution of thinning schemes which simultaneously (1) preserve the 60-fold symmetry inherent in the icosahedral partitioning technique for establishing element locations, and (2) permit the important pattern parameters to be estimated on a statistical basis as for purely randomly thinned arrays. (Author)

AD-614 919 Div. 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
PRODUCTION ENGINEERING MEASURE. HIGH SPEED SEMICONDUCTOR SWITCH (TWO TERMINAL) AND HIGH SPEED SEMICONDUCTOR SWITCH (GATE).
Quarterly rept. no. 7, 29 Nov 64-28 Feb 65,

by B. G. Burlingame and W. F. Munzer. 1965, 31p
Contract DA36 039AMC01475E
Unclassified report

See also AD-613 275.

Descriptors: (*Semiconductor devices, Manufacturing methods), (*Electronic switches, Semiconductor devices), Gates (Circuits), Switching circuits, Gold, Phosphorus, Diffusion, Voltage, Performance (Engineering), Production, Test equipment (Electronics), Electrical properties.

Activities during this quarter included the fabrication and testing of Engineering Samples, gold diffusion studies, the design and fabrication of dv/dt and turn-off time test gear, and partial evaluation of the three-terminal device under simulated operating conditions. (Author)

AD-614 921 Div. 8, 25
CFSTI Prices: HC$3.00 MF$0.75

Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group.
PHASED ARRAY STUDY.
Final rept. for 1 Jul 63-30 Mar 65.
30 Apr 65, 68p Rept. no. FR-65-14-72, 63HF-0110A-1420
Contract NObsr89427, Proj. SR0080302, Task 9637
Unclassified report

See also AD-611 582.

Descriptors: (*Phased arrays, Phased shifters), (*Phase shifters, Diodes (Semiconductor)), Electronic switches, Switching circuits, S-band, Digital systems, Antenna radiation patterns, Phase shift, Modules (Electronic), Scanning, Radiofrequency power, Performance (Engineering).

A ten element phased array using semiconductor diode phase shifters has been designed and tested at S-band. The design has emphasized maximum phase shifter capability for ultimate use in medium and high power phased array radar system applications. A hybrid coupled bit circuit was employed as the basic phase shifting circuit. The phase shifter circuit and diode were optimized to achieve high pulsed power capability with low insertion loss. The optimization procedure has lead to the use of a large junction capacitance diode operating in a low impedance circuit. Phase shifters were tested to a level of 5 kw peak and 200 w. average with no limiting or instabilities occurring. The diode bit insertion loss contribution was 1.3 db. Radiation pattern tests of the assembled antenna array showed side-lobe levels of between 20 and 25 db for most all cases over a beam scan range of ± 50 degrees. Phase shifter performance in the antenna array with regard to amplitude and phase errors was such as to produce pattern errors which were 10 to 15 db below the isotropic level. This allows the attainment of low side-lobe levels and a negligible reduction in antenna gain due to aperture errors. The experimental phase module design has lead to a proposed practical package employing the principles of the experimental module. The new design will be developed under a contract with the Navy Bureau of Ships. (Author)

AD-614 924 Div. 8, 26

Valpey-Fisher Corp., Holliston, Mass.
QUARTZ CRYSTAL UNIT CR-(XM-37)/U.
Quarterly progress rept. no. 9, 1 Jul-30 Sep 63.
30 Sep 63, 33p
Contract DA36 039SC85972 Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale. Rept. on Industrial Preparedness Study.

Descriptors: (*Quartz resonators, Manufacturing methods), (*Manufacturing methods, Quartz resonators), Tests, Processing, Aging (Materials), Resistance (Electrical), Crystal holders, Frequency, Temperature.

Preparation of Pre-Production samples is discussed. Testing is discussed and pertinent test data shown in tabular or graph form. (Author)

AD-614 926 Div. 8, 26
CFSTI Prices: HC$2.00 MF$0.50

ITT Electron Tube Div., Roanoke, Va.
PRODUCTION ENGINEERING MEASURE FOR TYPE FW-202 BARRIER GRID STORAGE TUBE.
Quarterly progress rept. no. 11, 1 Jan-31 Mar 64,
by D. D. Duggan. 1964, 43p Rept. no. 3235A
Contract DA36 039SC85967
Unclassified report

See also AD-604 732.

Descriptors: (*Storage tubes, Manufacturing methods), Electron beams, Electron guns, Life expectancy, Tests, Electron tube parts, Specifications, Glass seals.

Nine additional barrier grid tubes were assembled and exhausted during this report period. The beam current problem reported in AD-604 732 is still unresolved. A new gun was designed and will be assembled and tested during the next quarter. One barrier grid tube which meets complete specification was placed on life test. The circuitry for operating the barrier grid monitor tube was completed and is in operation. (Author)

AD-614 936 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
A SYSTEMATIC TREATMENT OF ERROR PROPAGATION FOR DESIGN EVALUATION AND PROCESS CONTROL OF ELECTRONIC DEVICES,
by W. W. Happ. Jan 62, 6p LMSC-6-90-61-114
Unclassified report

Descriptors: (*Electronics, Graphics), (*Graphics, Electronics), (*Errors, Propagation), (*Electronic equipment, Design), Numerical methods and procedures, Mathematical analysis.

A wide range of problems on error treatment involving a large number (say, between 10 and 100) interdependent device parameters can be approached systematically by graphical techniques. Representative examples from recent publications on design evaluation and control of electronic devices illustrate how flow graphs can be used to assess graphically error propagation. Applications occur in (i) the formulation of a problem, (ii) its analytical solution, (iii) its numerical evaluation. It is demonstrated that these graphical techniques reduce the amount of exposition, the computational effort, and the time required to communicate the solution of technical problems by at least a factor of ten. (Author)

AD-614 980 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
DESIGN OF NARROW-BAND, DIRECT-COUPLED

WAVEGUIDE FILTERS USING TRIPLE-POST INDUCTIVE OBSTACLES,
by E. A. Mariani. Mar 65, 27p
Technical rept. no. ECOM 2566
Proj. 1P6 22001A057, Task 1P6 22001A057 02
Unclassified report

Descriptors: (*Waveguide filters, Narrowband), (*Waveguide irises, Waveguide filters), Band-pass filters, Inductance, Theory, Design, Inverter circuits.

The theory and design of triple-post inductive obstacles are presented for the purpose of achieving direct-coupled, narrow-pass-band waveguide filters. A design procedure is discussed which permits the accurate design of filters with bandwidths of less than one percent. This type of filter construction is both mechanically simple and rugged without any sacrifice of electrical performance. (Author)

AD-614 989 Div. 8, 26
CFSTI Prices: HC$1.00 MF$0.50

General Instrument Corp., Darlington, S. C. Capacitor Div.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVED RELIABILITY OF CAPACITORS, FIXED SOLID ELECTROLYTE, TANTALUM HIGH-RELIABILITY 10MFD-20 VOLT CAPACITORS.
Quarterly rept. no. 6, 29 Sep-28 Dec 64,
by Floyd R. Banks, Jr. and A. DiGiacomo. 28 Dec 64, 16p
Contract DA36 039AMC03622E
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-612 876.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Reliability (Electronics), Fixed capacitors, Binders, Processing, Coatings, Carbon, Silver, Quality control, Life expectancy, Failure (Mechanics), Pyrolysis, Performance (Engineering).

The primary areas of process improvement studies were: (1) binder control; (2) anodizing and reforming; (3) pyrolytic conversion; (4) carbon and silver coating; and (5) materials control. In addition, capacitors were examined for parametric stability after 1000 and 2000 hours of life test. After 2000 hours of life test the average value of capacitance and dissipation factor remained unchanged, within the error of measurement, for sample sizes from Lots 1939-B and 1939-D; the average value of d-c leakage increased 23 percent for Lot 1939-B, and it decreased a factor of 16 for Lot 1939-D. Based upon the 2000 hour life test performance the best electrical characteristics have been obtained with Lot 1939-D. (Author)

AD-615 001 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Chrysler Corp., Huntsville, Ala.
X-BAND HIGH POWER CW AMPLIFIER AND AMPLIFIER CONSOLE.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 64,
by Allan W. Scott, Norman H. Pond, and Robert E. Eggers. 31 Dec 64, 25p
Contract DA36 039AMC03334E, Proj. 1P6 22001A055, Task 1P6 22001A055 04
Unclassified report

See also AD-443 082.

Descriptors: (*Traveling-wave tubes, Microwave amplifiers), (*Microwave amplifiers, Traveling-wave tubes), X band, Performance (Engineering), Life expectancy, Oscillation, Radiofrequency power, Impedance matching, Taper.

Efforts to develop a 12.5 kilowatt CW traveling-wave tube covering the frequency range from 7.7 Gc to 8.4 Gc are described. The tube is designed to be used in ground stations for satellite communications. The major effort during this quarter was directed at incorporating the efficiency taper into a CW tube. Results indicate that efficiency can indeed be improved by the use of tapering, however it was not possible to solve the oscillation problem and none of the tubes constructed during this period could be operated CW because of the oscillation difficulties. This problem arises from the fact that the coupled cavity structure is not a continuous structure but is composed of discrete elements. The impedance for the cavities in the tapered region differs from the impedance of the normal circuit and thus a mismatch occurs at this point. Because of this mismatch, and due to the high impedance, at the edge of the passband the tapered tubes have shown oscillations at all voltages. By driving the tubes these oscillations have been controlled, and useful test data has been obtained. These measurements show that efficiency has been improved by a factor of 1.3 to 1.5 and the oscillation problem can be solved. Thus, the tapering technique should be very useful. (Author)

AD-615 002 Div. 8, 5, 30
CFSTI Prices: HC$3.00 MF$0.75

Research Labs. Div., Bendix Corp., Southfield, Mich.
TRI-APERTURE DISSECTOR READOUT DEVICE.
Final rept.
15 Apr 65, 100p Rept. no. RLD-2953
Contract N123 62738 35256A
Unclassified report

Descriptors: (*Image tubes, Electron lenses), (*Electron lenses, Focusing), (*Electrostatic fields, Deflection), (*Electron multipliers, Image tubes), Input-out devices, Video signals, Lenses, Electron optics, Equations, Electrodes.

The purpose was to study the feasibility of a tri-aperture image dissector type readout device utilizing (1) a short, wide-angle electrostatic electron lens for focusing, (2) a yoke of continuous resistance plates for electrostatic deflection, and (3) a set of three multiplier elements for image dissection and video signal generation. The concept of a tri-aperture dissector type readout device was shown to be entirely feasible. Electro-optical imaging of a 2-inch diameter flat surface within a small aspect ratio was shown to approach the design goals. In addition, the use of metallic meshes or screens as electrodes resulted in advantages in image formation which obviate any disadvantages due to the mesh itself. The use of a single electrostatic deflection system was shown to be compatible with multiple readout apertures, and the continuous resistive type of deflection plates gave sensitivities higher than those calculated for other types of deflection systems. The basic design of a continuous channel electron multiplier with a resolution capability of 500 TV lines was established. A gain of better than 100,000 and an output current of 0.00001 ampere have been achieved. The three components focus, deflection, and dissection and readout operate together as a video signal generating tube.

AD-615 014 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Microwave Lab., Stanford Univ., Calif.
MULTIMEGAWATT BROADBAND MICROWAVE TUBES AND RELATED STUDIES.

Final rept. for 1 Nov 63-31 Oct 64,
by Marvin Chodorow. Mar 65, 61p
Rept. no. ML-1264
Contract AF30 602 2575, Proj. 5573, Task 557303
RADC TR-64-583
Unclassified report

See also AD-610 066.

Descriptors: (*Traveling-wavetubes, Microwave frequency), (*Microwave equipment, Traveling-wave tubes), (*Klystrons, Microwave frequency), Circuits, Broadband, Electron beams, Space charges, Electromagnetic waves, Propagation, Semiconductors, Acoustic equipment, Transducers, Plasma medium, Phase shifters, Delay lines.

The report summarizes the contract year. Individual abstracts for each task are as follows: I. Extended Interaction Klystrons: The small signal performance of a three-cavity extended interaction klystron operation in conjunction with the electron stick at 25 Kv, 1100 Mc is presented. II. Centipede TWT: Amplitude and phase characteristics within the coupled cavities are presented. III. Transverse Wave Studies: An analytical analysis of transverse wave propagation on an accelerated beam in an axially magnetic field is presented. IV. Whistler Mode Propagation in Solids: Preliminary calculations and discussion are presented. V. Carrier Wave Propagation in Solids: Preliminary results on a study of the Gunn effect are presented. VI. Acoustic Wave Devices: Progress in thin film coupler techniques is presented.

AD-615 020 Div. 8, 12
CFSTI Prices: HC$4.00 MF$0.75

Radiation, Inc., Melbourne, Fla.
STUDY OF SPECIAL BEAMSHAPING ANTENNAS.
Rept. no. 6, 1 Oct 64-28 Feb 65,
by H. E. Bartlett, B. L. Lewis, L. Pietsch, and G. W. Collins. 28 Feb 65, 112p
Contract DA28 043AMC00389S, Proj. IR3 32 101D253
Unclassified report

Continuation of Contract DA36 039AMC03310E.
See also AD-613 932.

Descriptors: (*Antennas, Dielectrics), (*Antenna configurations, Design), Antenna feeds, Weight, Mobile, Parabolic antennas, Dipole antennas, Lens antennas, Antenna radiation patterns, Expanded plastics, Inflatable structures, Reflectors, Cylindrical bodies.

Progress is reported on a program to develop dielectric elements for use in lightweight, highly-transportable satellite communications antennas. Dielectric elements investigated in order (1) to determine the dielectric element type most applicable to the transportable array problem and (2) to further reduce this element to useable hardware. The remaining portion of the program will consist primarily of the design, fabrication, and testing of an array model to demonstrate transportability features. The dielectric element investigations indicated that several types of dielectric elements are applicable. These elements were projected into possible array configurations which were evaluated and compared on the basis of transportability. As a result of these evaluations and comparisons, the reflector antenna with a Dielectric Cassegrain Feed has been found to be most applicable for use in highly-transportable systems and is more completely developed than the other dielectric element types. The Cylindrical Dielectric Antenna and the Dielectric-Loaded Reflector have been found to have some desirable characteristics for transportable applications. (Author)

AD-615 037 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., Auburn, N. Y. Semiconductor Products Dept.
RESEARCH AND DEVELOPMENT OF SILICON CONTROLLED RECTIFIERS FOR HIGH FREQUENCY AMPLIFIER APPLICATIONS.
Quarterly progress rept. no. 2, 16 Jan-16 Apr 65,
16 Apr 65, 28p
Contract NObsr91299, Proj. SR0080304, Task 9348
Unclassified report

See also AD-611 178.

Descriptors: (*Rectifiers, Silicon), (*Silicon, Rectifiers), High frequency, Design, Cathodes, Performance (Engineering), Semiconductor devices, Processing, Diffusion, Chemical milling, Metal coatings, Packaging.

Preliminary design information obtained from evaluating small interdigitated structures as well as test data gathered on large power SCR's have yielded two cathode geometry designs to be used in fabricating state-of-the-art devices. The steps of device assembly and the test equipment needed to evaluate the new devices are also discussed in this report. (Author)

AD-615 071 Div. 8

Institut d'Optique, Paris (France).
A NEW SYNCHRONOUS RECTIFIER (Un Nouveau Redresseur Synchrone),
by Ingo Wilmanns. 24 Jan 64, 2p
Grant AF EOAR63 48
AFOSR 65-0745
Unclassified report

Pub. in Journal de Physique v25 n11 p173A-4 Nov 1964
(Copies available only to DDC users).

Descriptors: (*Rectifiers, Transistors), France, Circuits.

Circuits using synchronous rectifiers are in general very complicated. This paper describes a circuit, consisting of two transistors (n-p-n and p-n-p) with single ended reference input and no drift. It is easy to obtain time constants of several seconds. (Author)

AD-615 092 Div. 8, 30

Pittsburgh Univ., Pa.
A FURTHER STUDY OF POSITIVE-NEGATIVE FEEDBACK CONTROL SYSTEMS.
Doctoral thesis,
by John Paul Hyde. 1965, 247p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.
See also AD-417 218.

Descriptors: (*Switching circuits, Feedback), (*Feedback, Control systems), Servomechanisms, Nonlinear systems, Linear systems, Polynomials, Equations.

The design and performance of positive-negative feedback (P-NF) switching control systems, which switch back and forth between direct positive- and negative-feedback modes, are investigated with the ultimate objective of developing a P-NF system which can satisfycertain common performance requirements better than either a linear negative-feedback (LN-F) system or a 'bang-bang'

switching control system. A simple technique for improving the performance of the sampling P-NF system is developed. It is asserted and demonstrated that, by inserting simple gain compensators inthe positive- and negative- feedback loops, the step-input response time and the system's bandwidth can be simultaneously reduced. To compare the controller complexity and the performance of a sampling P-NF system with those of an ideal 'bang-bang' system, a 'bang-bang' controller is designed for a typical plant to respond to step-function inputs without overshooting. It is concluded that the sampling P-NF switching control system is unique amongnon-linear and switching control systems in that its step-input transient response and its sinusoidal-input frequency response both obey the homogeneity principle.

AD-615 097 Div. 8, 26
CFSTI Prices:HC$1.00 MF$0.50

General Instrument Corp., Darlington, S. C.
Capacitor Div.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVED RELIABILITY OF CAPACITORS, FIXED, SOLID ELECTROLYTE, TANTALUM HIGH-RELIABILITY 10MFD-20 VOLT CAPACITORS.
Quarterly rept. no. 5, 29 Jun-28 Sep 64,
by Floyd R. Banks, Jr. and A. Di Giacomo.
28 Sep 64, 19p
Contract DA36 039AMC03622E
Unclassified report

See also AD-614 989.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Reliability (Electronics), Fixed capacitors, Processing, Carbon, Silver, Coatings, Aging (Materials), Oxidation, Voltage.

The primary areas of process improvement studies were: (1) anodizing and re-forming; (2) carbon and silver coating; and (3) ageing. Tests of significance were performed on twelve combinations of process variables which were studied during this period; the variables were: (1) re-form voltages; (2) the number of carbon coats; and (3) carbon curing temperatures. Two primary conclusions derived from the work are: (1) Lot 1939, with the higher re-form voltage compared with Lot 1940, has a significantly lower average capacitance and dissipation factor, and somewhat higher d-c leakages; and (2) capacitors with 2-carbon coats and the 150C cure have lower average d-c leakages compared with the 125C cure on Lot 1940, whereas the converse is true for Lot 1939. (Author)

AD-615 113 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
SEMICONDUCTOR REFLECTION-TYPE MICROWAVE MODULATOR,
by Harold Jacobs, Richard W. Benjamin, and Dale A. Holmes. Feb 65, 28p
Technical rept. no. ECOM-2556
Proj. 1P6 22001A056, Task 1P6 22001A056 04
Unclassified report

Descriptors: (*Microwave equipment, Modulators), (*Semiconductor devices, Microwave equipment), (*Modulators, Microwave equipment), Amplitude modulation, Phase modulation, Microwaves, Reflection, Waveguides, Dielectrics, Cavity resonators, Germanium, Silica, Theory.

A new type of microwave modulator is proposed. The electromagnetic radiation is reflected from a semiconductor block inserted in a wave guide. The block is placed just before a short. At low values of conductivity the semiconductor acts as a resonant cavity and the reflection coefficient will vary as conductivity and length for a given frequency. At multiples of odd quarter wavelengths the reflection is minimized and at one of these points the reflection coefficient is nearly zero due to almost complete absorption in the block. By using a semiconductor of critical length for a given frequency and varying its conductivity, relatively large effects can be observed in amplitude and phase modulation. Detailed calculations were carried out for germanium and silicon with radiation at to to the 10th power cycles per second, and preliminary experiments verified the manner in which amplitude changes with conductivity. (Author)

AD-615 123 Div. 8
CFSTI Prices: HC$4.00 MF$0.75

Microwave Associates, Inc., Burlington, Mass.
BROADBAND MICROWAVE POWER LIMITERS.
Final rept. for 21 Jun 63-31 Jan 65,
by L. Nathanson. 31 Jan 65, 111p
Contract NObsr89462, Proj. SR0080302, Task 9637
Unclassified report

See also AD-602 793.

Descriptors: (*Microwave equipment, Limiters), (*Limiters, Broadband), Diodes (Semiconductor), Low-pass filters, Transformers, Varactor diodes, Feedback, Design, L band, C band, X band, Radio-frequency power, Circuits.

The report contains results secured during the entire period of this contract, from June 1963 through January 1965. Theoretical aspects are included pertaining to diode characteristics and behavior, and diode limiter design including low-pass filter design, quarter-wave transformer theory, and varactor and feedback limiter configurations. The high power considerations presented refer to both optimum circuit considerations and to diode temperature response. Also presented are the final design information and final experimental results of the L/S-band (1-4.5 Gc/s), C-band (4-7.5 Gc/s), and X-band (7-11 Gc/s) high and low power limiters. (Author)

AD-615 125 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
SMALL SIGNAL FUNCTIONAL CIRCUITS.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 64,
by James Feit. 31 Dec 64, 34p
Contract DA28 043AMC00150E, Task IP622001A056 02
Unclassified report

Descriptors: (*Integrated circuits, Radio receivers), (*Radio receivers, Integrated circuits), Frequency modulation, Circuits, Radiofrequency amplifiers, Oscillators, Mixers (Electronics), Intermediate amplifiers, Microminiaturization (Electronics), Silicon.

The report describes the second quarter's effort leading to the design and fabrication of linear integrated circuits to be used in an FM receiver. This work covers the development of circuits to be used in the receiver front end (before the i-f filter). During the second quarter, breadboard designs for the front end circuits were evaluated. By evaluating performance of the individual circuits and their performance in a bread-

board receiver, configurations were selected for the front end circuits. The circuits chosen are outlined below. (1) RF Amplifier. A direct coupled common emitter-common emitter stage was selected for the rf amplifier. (2) First Oscillator. Of the circuits evaluated for a first oscillator, one employing positive feedback from collector to emitter was selected. Additional negative feedback from collector to base is utilized to restrict the frequency of oscillation to the proper crystal overtone frequency. (3) Second Oscillator. The second oscillator employs a grounded collector configuration. (4) Mixer. One circuit was designed to serve as both the first and second mixer. This circuit is basically a common emitter stage biased so that conduction is established by the local oscillator injection. The above circuits are presently being fabricated in integrated circuit form. (Author)

AD-615 127 Div. 8, 26
CFSTI Prices: HC$4.00 MF$0.75

TRW Semiconductors, Inc., Lawndale, Calif.
TRANSISTOR, VHF, SILICON, POWER (50W - 150mc).
Final rept. for 1 Jul 63-30 Jun 64,
by S. H. Barnes, M. O. Preletz, and B. Rappaport.
30 Jun 64, 106p Rept. no. TRWS-46-RD-F
Contract DA36 039AMC02355E

Unclassified report

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Descriptors: (*Transistors, Very high frequency), (*Silicon, Transistors), Radiofrequency power, Vapor platings, Oxides, Films, Performance (Engineering), Packaging, Design, Manufacturing methods.

The transistor was designed on the principle of paralleling a group of small transistor cells to build up to the required power. Three basic designs were made in the course of optimizing the RF and thermal performance of the device. Equalizing the base feed to each cell was determined to be a critical factor in getting all the cells to work together. An important feature of the cell structure is that an individual cell which exhibits poor characteristics can be disconnected from the pattern by photoresist techniques, a potent factor in keeping production yields high. Two new processes are worthy of note. The first is theevaporation of metal contacts over oxide layers in sufficient thickness to conduct the required current. The second is the deposition of oxide layers by the decomposition of ethyl silicate, which served to preclude holes in the grown oxide layers due to imperfections in the photoresist masks or other causes. The package which was finally used for the transistor samples was a beryllia disk package which had demonstrated its reliability and performance on a commercially available 5W-250mc transistor (PT2600). With the 50W-150mc transistor crystal the package was shown to be capable of dissipating 125 watts. A significant feature of the program was the coordinated development of the device-circuit combination to give optimal total performance of the 50W, 150mc circuit block. (Author)

AD-615 141 Div. 8, 2

Florida Univ., Gainesville.
AXIAL RATIO OF THE PROJECTED POLARIZATION ELLIPSE,
by S. Ramu. 26 Aug 64, 4p

Unclassified report

Pub. in Australian Journal of Physics v17 n4 p556-8 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Radio waves, Polarizations), Radio astronomy, Dipole antennas, Angle of arrival, Projective geometry, Curve fitting.

The axial ratio of the polarization ellipse of a radio wave is often evaluated using a crossed-dipole antenna system placed in a horizontal plane. The axial ratio of the ellipse as deduced from the responses of the two antennas should correspond to the axial ratio of the ellipse in the wave-front as projected onto the horizontal plane. When one of the two dipoles is situated in the plane of incidence of the radio wave, the axial ratio of the projected polarization ellipse is a function of the angle of incidence and the orientation of the polarization ellipse in the wave-front. A convenient parameter with which to relate axial ratio and orientation is the angle made by the major axis with the line of intersection of the wave-front with the horizontal plane. This line would actually correspond to the direction of one of the dipoles when the other is situated in the incident plane. In his paper 'Polarization measurements of Jupiter radio bursts at 10.1 Mc/s', Dowden (Aust. J. Phys. 16: 398-410. (1963)) investigated the extent of variation of the axial ratio of the projected ellipse with the angle of incidence and with orientation. In the equations presented by him for evaluating the projected axial ratio, there appears to be an omission; the curves shown could not be reproduced by using the equations he gives. The purpose of this communication is to present a set of equations from which these curves can be reproduced. A set of curves, drawn by using equations, is shown.

AD-615 150 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Electron Physics Lab., Univ. of Michigan, Ann Arbor.
INVESTIGATION OF LARGE-SIGNAL KLYSTRON AND TRAVELING-WAVE DEVICES.
Quarterly progress rept. no. 1, 1 Sep-30 Nov 64,
by G. T. Konrad and J. E. Rowe. Mar 65, 57p
Contract AF30 602 3569, Projs. 5573, 06847,
Task 557303
RADC TR-64-585

Unclassified report

Descriptors: (*Klystrons, Performance (Engineering)), (*Traveling-wave tubes, Performance (Engineering)), Theory, Space charges, Nonlinear systems, Boundary valve problems,Electron beams, Noise (Radio), Electron guns, Magnetrons, Numerical analysis, Focusing, Backward-wave oscillators, S band, Stability.

A general nonlinear two-dimensional interaction theory is employed to analyze Brillouin flow in the presence of large-signal r-f on the circuit. Finite values of axial magnetic field and radial variations of both the circuit and space-charge fields are assumed. The present status of the nonlinear boundary-value problem solution for electron and plasma devices is described. The computer program is ready for checkout. Considerations in the initiation of two experimental programs are described. One is a study of beam stability in the presence of large r-f fields, while the second deals with velocity distribution effects on the start-oscillation conditions of BWO's. Results of cold tests made on several ring-and-bar circuits are summarized. Calculations on a phase-focused ring-and-bar tube are initiated. Two digital computer programs for the solution of electron guns are being worked on. The first deals with magnetron injection guns and is shown not to be reliable as yet. The second one is concerned with relativistic electron beams. This program is ready for checkout. Preliminary work on the design of a tube for checking the noise properties of a beam obtained from a magnetron injection gun is described. Design considerations for a noise transformer are given. (Author)

AD-615 162 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

TRG, Inc., Melville, N. Y.
DEVELOPMENT OF A LOW-NOISE MILLIMETER-WAVE PARAMETRIC AMPLIFIER.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 64, by B. Albrecht, J. Kliphuis, and D. Neuf. 31 Dec 64 20p
Contract DA36 039AMC02365E,
Proj. 1G6 22001A065
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-602 169.

Descriptors: (*Parametric amplifiers, Millimeter waves), (*Millimeter waves, Parametric amplifiers), (*Varactor diodes, Parametric amplifiers), Electrical impedance, Subminiature electronic equipment, Extremely high frequency, Noise (Radio), Gain, Waveguide circulators, Circuits, Pumping (Electronics).

Room-temperature impedance measurements made on several subminiature surface-barrier varactors with etched substrate surfaces indicate a significant improvement in performance at 90 Gc over that previously obtained with larger diodes having unetched substrates. However, the resulting cut-off frequencies of the etched varactors are still well below the value required for gain at 90 Gc. A breadboard 94-Gc amplifier mount has been fabricated that exhibits low loss at the signal and pump frequencies. Further tests on this amplifier cannot be made until a higher cut-off frequency diode is available. (Author)

AD-615 180 Div. 8, 30

National Research Council of Canada, Ottawa (Ontario). Div. of Radio and Electrical Engineering.
COLD LOADS AS STANDARD NOISE SOURCES,
by A. Jurkus. 20 Aug 64, 3p NRC-8189
Unclassified report

Pub. in Proceedings of the IEEE v53 n2 p176-7 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Radiometers, Calibration), (*Noise (Radio), Standards), Canada, Waveguides, C band, Standing wave ratios, Voltage, Plastics, Iron, Powders, Attenuation, Temperature, Standards.

The correspondence describes the construction and a partial evaluation of two waveguide loads to be used as standard noise sources for calibrating a C-band radiometer having a center frequency of 6.6 Gc and a bandwidth of approximately 600 Mc. The loads are immersed in liquid nitrogen and liquid oxygen, respectively, to give a known noise temperature difference. This difference is not exactly equal to the difference between the boiling points of nitrogen and oxygen due to the attenuation of the waveguide and the VSWR of the load; measurements have been made to take these effects into account. (Author)

9. Fluid Mechanics

AD-614 594 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

California Univ., Los Angeles. Dept. of Engineering.
AN AEROSONICS BIBLIOGRAPHY.
Supplement no. 2,
by Alan Powell and Louis Solomon. Apr 65, 27p
Rept. no. 65-3
Contract Nonr23362, Projs. RR009 01 01, NR062 229
Unclassified report

Supplement to Engineering Repts. no. 63-51, AD-425 670, and no. 64-20, AD-600 455.

Descriptors: (*Aerodynamic characteristics, Bibliographies), Acoustics, Supersonic flow, Jets, Fluid mechanics, Indexes, Sonic boom, Shock waves, Sonic fatigue, Vortices, Boundary layer, Turbulence, Noise, Hydrodynamics, Structures, Propellers (Aerial).

A bibliography of 363 references is given on the following topics: aerodynamic sound; structural excitation by flows and sound, fatigue; flow past bodies, boundary layer; fluid instability, acoustic streaming, vortical flow; jet flows and wakes, turbulence; jet noise suppression devices; propellers and rotors; rocket noise; resonance and oscillation; sonic boom and shock waves; sound propagation, scattering, transmission attenuation and reflection; structural and wave dynamics; thermoacoustics; hydrodynamics.

AD-614 616 Div. 9, 1
CFSTI Prices: HC$3.00 MF$0.75

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
CHARACTERISTICS OF A RECTANGULAR WING WITH A PERIPHERAL JET IN GROUND EFFECT, PART III,
by D. Surry. Aug 64, 80p
Technical note no. UTIAS-TN-77
Contract AF33 657 8451
Unclassified report

Research supported in part by Defence Research Board, Ottawa, and National Research Council of Canada, Ottawa. See also AD-290 393.

Descriptors: (*Short take-off planes, Ground effect machines), (*Ground effect machines, Short take-off planes), (*Wings, Ground effect), Jets, Wind tunnel models, Models tests, Lift, Drag, Pitch (Motion), Take-off, Landings, Flaps, Coanda effect, Angle of attack, Velocity, Aerodynamic configurations, Aerodynamics, Thrust, Stability, Mathematical analysis.

Lift, drag, and pitching moment were measured on a rectangular wing with a peripheral jet in ground effect for three angles of attack, three heights above ground, and for a range of forward speeds necessary for take-off calculations. Furthermore, nine configurations were tested in this fashion - each with different jet angles and different ratios of L.E. to T.E. jet strengths. Whereever possible, procedures were automated and on-line data reduction was used. Some flow visualization tests were made on specific configurations. The results were used to study an integrated lift and propulsion system for air-cushion take-off and landing. These calculations showed little advantage to be gained from using variable jet strengths and angles during take-off at constant height when compared to fixed configuration results. The latter used angle of attack, or diversion of thrust from the cushion to direct forward thrust as means for keeping the height constant. A simple take-off procedure in which the height is allowed to increase naturally, led to slightly poorer results, but all the take-off procedures studied provided short-field performance. (Author)

AD-614 617 Div. 9
CFSTI Prices: HC$3.00 MF$0.75

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
AN EXPERIMENTAL INVESTIGATION INTO THE SHAPE OF THRUST AUGMENTING SURFACES IN CONJUNCTION WITH COANDA-DEFLECTED JET SHEETS, PART II,
by T. Mehus. Jan 65, 63p
Technical note no. UTIAS TN-79
Grant DA TC44 177G1, Task 1D121401A14224
Unclassified report

Descriptors: (*Aerodynamic control surfaces, Aerodynamic configurations), (*Coanda effect, Thrust), (*Thrust, Coanda effect), Jets, Lift, Drag, Subsonic nozzles, Supersonic nozzles, Vertical take-off planes, Short take-off planes, Ground effect machines, Instrumentation, Momentum, Optimization, Canada.

The present work is a continuation of the experimental investigations described in AD-611 759. The purpose was to increase the thrust augmentation of a configuration consisting of a Coanda surface (quadrant), deflecting the primary jet sheet through 90 degrees, in conjunction with additional (thrust augmenting) surfaces. The effect of a horizontal and vertical gap between the lip of the nozzle and the leading edge of the deflection surface, as well as the effect of a gap between its trailing edge and the downstream diffuser wall (tertiary flow) was studied. These experiments were carried out for a convergent (subsonic) and a convergent-divergent (supersonic) nozzle at various pressure ratios. The subsonic jet sheet produced the highest thrust augmentation. Tilting of the quadrant led to an increase in the augmentation ratio (excluding the lift acting on the nozzle), while the total thrust augmentation (including the lift over the nozzle) did not increase. Typical secondary and exit mixed flow velocity profiles were obtained. The highest total thrust augmentation observed was 1.37. (Author)

AD-614 627 Div. 9
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Lab., White Oak, Md.
ON THE HYPERSONIC SHARP LEADING EDGE PROBLEM FOR BODIES OTHER THAN FLAT PLATES,
Aerodynamics Research rept. (Final),
by Jay M. Solomon. 5 Mar 65, 66p
Rept. no. Aerody RR-241, NOL TR-65-8
Unclassified report

Descriptors: (*Hypersonic flow, Slender bodies), (*Fluid mechanics, Hypersonic flow), (*Laminar boundary layer, Hypersonic flow), Two-dimensional flow, Axially symmetric flow, Mathematical analysis.

The flow near the tip of pointed nosed bodies in hypersonic flight is considered. In particular, the region where continuum concepts are applicable, but where boundary layer theory is no longer valid, is studied using the model proposed by Oguchi for the flat plate problem. Both two-dimensional and axially-symmetric bodies are considered. Solutions are obtained in the form of expansions valid near the nose tip. The surface pressure is found to approach a finite value as the tip is approached; numerical results for this limit value are obtained for various wall to total temperature ratios and tip semi-vertex angles. (Author)

AD-614 629 Div. 9
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EXPERIMENTAL INVESTIGATION OF INTERACTION OF COMPRESSION SHOCKS AND THE BOUNDARY LAYER IN THE RANGE OF MACH NUMBERS BETWEEN = 1.0 AND 1.8,
by G. L. Grodzovskii. 15 Mar 65, 24p
FTD-MT-64-258
TT 65-62077

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR, Izvestiya. Energetika i Transport, n4 p20-31 1961.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Shock waves, Boundary layer), (*Supersonic flow, Separation), (*Boundary layer, Separation), Airfoils, Turbulent boundary layer, Nozzles, Flat plate models, USSR.

AD-614 633 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Frankford Arsenal, Philadelphia, Pa. Research and Development Directorate.
STEADY DISTURBANCES TO VISCOUS, HIGHLY CONDUCTING LAMINAR BOUNDARY LAYER FLOW OVER A NONCONDUCTING WALL WITH PARALLEL MAGNETIC FIELD.
Technical research rept.,
by Stephen Jarvis, Jr. Dec 62, 47p
Memo rept. no. M63-20-1
Proj. 599 25 001

Unclassified report

Descriptors: (*Laminar flow, Viscosity), (*Magnetohydrodynamics, Laminar boundary layer), Perturbation theory, Fluid flow, Conductivity.

Steady disturbances to laminar boundary layer flow over a flat wall bounding a nonconducting rigid medium in the presence of a parallel magnetic field are examined. Disturbances are assumed due to both small wall irregularities and to weak incident waves when these may exist in the uniform stream outside of the boundary layer. The viscosity and electrical resistivity are assumed to be small, and heat conduction is assumed to be absent. It is shown that, adjacent to the wall, there is a critical layer in which the flow behavior depends on the relative smallness of the viscosity and the resistivity. Outside this layer, the flow is adequately given by a solution of the degenerate equation obtained by taking the viscosity and the resistivity zero. The resulting emitted waves, current sheet, wall pressure, and upstream behavior depend critically on the relative smallness of the viscosity and resistivity. (Author)

AD-614 660 Div. 9

California Univ., Berkeley.
WATER WAVES IN TRIANGULAR CANALS.
Technical rept.,
by Asghar Saeed Farooque. Aug 64, 73p
Contract Nonr22260

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
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Descriptors: (*Water waves, Inland waterways), Boundary value problems, Trigonometry, Two-dimensional flow, Three-dimensional flow, Green's function, Integral equations, Hydrodynamics.

The problem considered is the two and three dimensional modes of motion in a triangular canal whose sides form an angle pi alpha (o < alpha < 1/2) with the horizontal. Using a linearized theory, the problem becomes a boundary value problem for the triangle with mixed boundary conditions. Green's identity is used to convert the problem into an integral equation. In the two dimensional case, the existence and uniqueness of the solution is proved. The solution is at most logarithmically singular at the intersection of the free surface with the sides. For a point spectrum of values of a certain parameter, bounded solutions are obtained. In the case of 45 degrees, the singular solution is constructed explicitly in the form of an infinite series. For the case of three dimensions, the existence of solutions with at most a logarithmic singularity has been proved and a condition for the boundedness of a solution has been obtained. (Author)

AD-614 661 Div. 9

Purdue Univ., Lafayette, Ind.
THE EFFECT OF THE STARTING LENGTH ON MASS TRANSFER FROM A CONE IN SUPERSONIC FLOW.
Master's thesis,
by David Hugh Quick. Jun 65, 80p

Unclassified report

Research supported by Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
Available only for Reference use at DDC field services. Copy not available for public sale.

Descriptors: (*Supersonic flow, Conical bodies), (*Fluid mechanics, Supersonic flow), Thermodynamics, Solids, Organic coatings, Copper, Incompressible flow, Compressible flow, Test equipment, Supersonic wind tunnels.

The purpose of this investigation was to see what effect, if any, the starting length had on mass transfer from a cone. A blowdown supersonic wind tunnel was utilized to bring about a flow regime of approximately Mach 3.15. The experimental results of mass transfer from cones in supersonic flow are presented and a comparison to theoretical values is made. The cones used in the mass transfer tests were made of copper coated with p-dichlorobenzene. The amount of mass transfer was determined by weighing the cones before and after each test run. The error due to mass lost during transit from the scales to the test section and back was taken into account by later measuring an average mass transfer per unit time due to free convection alone. The results of the mass transfer tests are presented in a plot of mass transfer Colburn j factor as a function of Reynolds number. (Author)

AD-614 664 Div. 9
CFSTI Prices: HC$3.00 MF$0.75

Pittsburgh Univ., Pa.
AXIAL TEMPERATURE GRADIENT IN FLOW WITH SURFACE BOILING.
Master's thesis,
by Roger Fuller Tracy, Jr. Mar 65, 80p

Unclassified report

Descriptors: (*Heat transfer, Fluid flow), (*Boiling, Fluid flow), (*Fluid flow, Surface properties), Bubbles, Nucheation, Vapor, Turbulence, Boundary layer, Pipes, Fluid mechanics, Theory, Test methods, Experimental data, Water.

The purpose of the investigation was to determine how the temperature of subcooled water varies as it flowed through a heated pipe. The inside wall temperature of the pipe was high enough to cause surface boiling. It was seen that the water temperature did not increase for approximately the first foot along the test section. It was felt that this reflected the period required for the thermal boundary layer to grow to its fully developed form. Several approximations to heat transfer theory were used to arrive at an expression for the distance required for the boundary layer to develop. Agreement with experimental results was within thirty-five per cent. In runs where the saturation state was attained the maximum temperature was always greater than saturation temperature. It is assumed that bubbles of superheated steam in the water caused the thermocouples to sense an average temperature between saturated water and superheated steam. It was also noted that in some cases the temperature continued to increase in this region. Not enough is known about two phase mixtures to be able to explain this pattern.

AD-614 666 Div. 9, 12
CFSTI Prices: HC$3.00 MF$0.75

Kaman Nuclear, Colorado Springs, Colo.
HEAD-ON INTERACTION OF SHOCK FRONTS AND BOW WAVES OF RE-ENTRY VEHICLES,
by Belmont S. Evans and Louis E. Bothell.
3 Mar 65, 73p KN-65-43(R)
Contract NOsp64021c
Unclassified report

Descriptors: (*Reentry vehicles, Shock waves), (*Shock waves, Equations), Atmosphere entry, Equations of state, Statistical data, Tables, Graphics, Air.

The report outlines in detail a method for calculating resultant shocks produced by head-on interaction of a shock front with the bow wave of a re-entry vehicle. The latest available equation of state for air data was used in calculating shock conditions for a number of altitudes, R/V velocities, and shock overpressures that are assumed to be of greatest interest in ABM problems. While the calculations described involve primarily a bow wave and a shock, the same methods apply to the head-on interaction of two planar shock fronts.

AD-614 671 Div. 9, 13
CFSTI Prices: HC$3.00 MF$0.50

Oklahoma Univ., Norman.
EVALUATION OF THE CAPILLARY-ORIFICE MODEL OF HIGH-SPEED FLOW THROUGH POROUS MEDIA.
Master's thesis,
by John Earl West. 1965, 51p
Unclassified report

See also AD-297 907.

Descriptors: (*Porous materials, Fluid flow), (*Fluid flow, Porous materials), (*Capillaries, Orifices), Models (Simulations), Reynolds number, Flowmeters, Programming (Computers), Pressure, Theory.

The primary purpose was to determine whether the 'capillary-orifice model' of Blick (E. F. Blick, 'High-speed flow through porous media', Ph. D. dissertation, Univ. of Oklahoma, 1963) would give experimental results that correlate to the flow through the media. The models under test were constructed from acrylic plastic tubing and 0.125-in. acrylic plastic sheet. Excellent correlation was obtained for Reynolds numbers greater than 1000. With a model of 0.50-inch tube diameter, the ratio of orifice diameter to tube diameter desired was 0.72. Improved correlation could possibly be obtained by basing the orifice spacing upon both mean pore diameter and porosity, especially in the case of porous media not formed from particles. The ratio of orifice diameter to tube diameter would seem to be statistically related to the pore size distribution. A Fortran program is given for use in data reduction with two mass-indicating flowmeters.

AD-614 672 Div. 9, 1, 31
CFSTI Prices: HC$3.00 MF$0.75

Oceanics, Inc., Plainview, N. Y.
EXPERIMENTAL MODEL STUDIES OF THE DYNAMIC VELOCITY FLUCTUATIONS EXISTING IN THE AIR WAKE OF AN AIRCRAFT CARRIER. PART I: TEXT,
by August F. Lehman and Paul Kaplan. Mar 65,
87p Rept. no. 65-21, pt. 1
Contract Nonr418600, Proj. RR011 05 04
Unclassified report

Descriptors: (*Wake, Aircraft carriers), (*Carrier landings, Turbulence), (*Aircraft carriers, Fluid dynamic properties), Aerodynamic characteristics, Air, Model tests, Water tunnels, Test methods, Wind, Velocity, Instrumentation.

Experimental investigations were undertaken in a water tunnel to measure the dynamic horizontal and vertical velocity fluctuations existing in the air wake of a carrier and encountered by landing aircraft. A description of the instrumentation developed, and an analysis of the methods employed in converting data to pitch transfer functions (amplitude and phase) is given together with the determination of power spectra information. Conclusions regarding instrumentation, test data interpretation and operational procedures for the carrier and aircraft are presented. (Author)

AD-614 673 Div. 9, 1, 31
CFSTI Prices: HC$3.00 MF$0.75

Oceanics, Inc., Plainview, N. Y.
EXPERIMENTAL MODEL STUDIES OF THE DYNAMIC VELOCITY FLUCTUATIONS EXISTING IN THE AIR WAKE OF AN AIRCRAFT CARRIER. PART II: APPENDIX (GRAPHS OF EXPERIMENTAL DATA),
by August F. Lehman and Paul Kaplan. Mar 65,
63p Rept. no. 65-21, pt. 2
Contract Nonr418600
Unclassified report

Descriptors: (*Wake, Aircraft carriers), (*Carrier landings, Turbulence), (*Aircraft carriers, Fluid dynamic properties), Air, Model tests, Water tunnels, Experimental data, Graphics, Aerodynamic characteristics.

AD-614 686 Div. 9, 10
CFSTI Prices: HC$1.00 MF$0.50

Southwest Research Inst., San Antonio, Tex.
TOTAL FORCE RESPONSE RESULTING FROM LIQUID SLOSHING IN A RIGID CYLINDRICAL TANK WITH A VERTICAL CENTER WALL BAFFLE,
by H. Norman Abramson and Guido E. Ransleben, Jr.
1 May 61, 14p Technical rept. no. TR-9
Contract DA23 072ORD1251, Proj. 43 768 2
Unclassified report

Descriptors: (*Sloshing, Liquid rocket propellants), (*Liquid rocket propellants, Sloshing), (*Propellant tanks, Sloshing), Force (Mechanics), Cylindrical bodies, Fuel tanks, Separation, Stiffened cylinders, Pitch (Motion), Center of gravity, Control systems, Automatic, Test equipment.

As one simple means of avoiding dynamic coupling between sloshing of liquid propellants and automatic control system response, it has been suggested that propellant tanks be compartmented so as to raise the normal sloshing frequencies. The present paper presents measured values of total force response for a rigid cylindrical tank with a vertical center wall (half-tank) excited in translation and in pitching about the liquid center of gravity. The test equipment and procedures are described. (Author)

AD-614 688 Div. 9, 30
CFSTI Prices: HC$2.00 MF$0.50

Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
SOME EXPERIMENTS ON EQUILIBRIUM TURBULENT BOUNDARY LAYERS IN FAVORABLE PRESSURE GRADIENTS,
by H. J. Herring and J. F. Norbury. Nov 63, 26p
Rept. no. FLD-15
Contract Nonr185838, Proj. SR009 01 01
See also AD-601 276, AD-601 277. Unclassified report

Descriptors: (*Turbulent boundary layer, Pressure), (*Wind tunnels, Turbulent boundary layer), Experimental data, Fluid mechanics, Mathematical analysis.

A boundary layer wind tunnel in which an arbitrary negative pressure gradient could be developed was designed and built. The effects of selected pressure gradients on boundary layers grown on one of the walls of the tunnel were studied. It was possible to obtain equilibrium boundary layers of the type first suggested by Clauser, that is layers whose non-dimensional velocity defect distribution is invariant along the direction of flow. The velocity defect distributions for two such boundary layers were established, corresponding to values of B of -0.35 and -0.53, where B is Clauser's non-dimensional pressure gradient parameter. These velocity profiles are compared with the profiles predicted by the Mellor-Gibson theory. The agreement between the two is very good. (Author)

AD-614 689 Div. 9
CFSTI Prices: HC$1.00 MF$0.50

Massachusetts Inst. of Tech., Cambridge.
INVESTIGATION ON THE BOUNDARY LAYER IN A CORNER,
Final rept.,
by Ascher H. Shapiro. Mar 63, 8p
Contract DA19 020ORD4538, Projs. DSR5 7817, 1935
AROD 1935.3-E
Unclassified report

Descriptors: (*Laminar boundary layer, Three-dimensional flow), (*Turbulence, Ducts), Incompressible flow, Boundary layer, Separation, Rectangular bodies, Momentum, Electroluminescence, Thrust, Reynolds number, Orfices, Bubbles, Fluid flow, Abstracting.

Abstracts are presented of reports on the following topics: three-dimensional laminar boundary layer along a corner; fully developed turbulent flow in straight rectangular ducts - secondary flow, its cause and effect on the primary flow; electrochemiluminescence; thrust of a small orifice at low Reynolds numbers; and formation of bubbles in a uniformly fluidized bed.

AD-614 695 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
SOME EXPERIMENTS ON THE FLOW OF A RAREFIED GAS THROUGH A CIRCULAR ORIFICE,
by A. K. Sreekanth. Dec 63, 42p
Technical rept. no. TR-86, D1-82-0322
Unclassified report

Descriptors: (*Gas flow, Orifices), Rings, Nitrogen, Low-pressure research, Fluid mechanics, Graphics, Experimental data.

The mass flow of nitrogen gas through a circular orifice was measured at five Knudsen number values between 0.13 and 1.78 for a range of upstream-to-downstream pressure ratios from 1 to 18. The Knudsen number in this case is defined as the ratio of upstream mean free path to the diameter of the orifice. For extremely low pressure ratios across the orifice the present results show a very smooth transition from the continuum flow theoretical value, at very low Knudsen numbers, to the free molecule flow limit. Using a free molecule flow pressure probe, some pressure measurements were taken to study the structure of the jet downstream of the orifice. (Author)

AD-614 719 Div. 9

Stanford Univ., Calif. Div of Engineering Mechanics.
SECOND-ORDER BOUNDARY-LAYER EFFECTS IN HYPERSONIC FLOW PAST AXISYMMETRIC BLUNT BODIES,
by R. T. Davis and I. Flugge-Lotz. 25 May 64, 31p
Grants AF AFOSR62-242, AF AFOSR235 63
AFOSR 65-0626
Unclassified report

Pub. in Journal of Fluid Mechanics v20 p4 p593-623 1964 (Copies available only to DDC users).

Descriptors: (*Hypersonic flow, Boundary layer), (*Blunt bodies, Hypersonic flow), (*Boundary layer, Hypersonic flow), Axially symmetric flow, Reentry vehicles, Atmosphere entry, Superaerodynamics, High altitude, Bodies of revolution, Spheres, Stagnation point, Vortices, Series, Perturbation theory.

First- and second-order boundary-layer theory are examined in detail for some specific flow cases of practical interest. These cases are for flows over blunt axisymmetric bodies in hypersonic high-altitude (or low density) flow where second-order boundary-layer quantities may become important. These cases consist of flow over a hyperboloid and a paraboloid both with free-stream Mach number infinity and flow over a sphere at free-stream Mach number 10. The method employed in finding the solutions is an implicit finite-difference scheme. It is found to exhibit both stability and accuracy in the examples computed. The method consists of starting near the stagnation-point of a blunt body and marching downstream along the body surface. Several interesting properties of the boundary layer are pointed out, such as the nature of some second-order boundary-layer quantities far downstream in the flow past a sphere and the effect of strong vorticity interaction on the second-order boundary layer in the flow past a hyperboloid. In several of the flow cases, results are compared with other theories and experiments. (Author)

AD-614 760 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

IMPINGEMENT OF AN ANNULAR JET ON A SCREEN,
by V. I. Khanzhonkov. 9 Apr 65, 30p FTD-TT-64-513
TT 65-62080

Unclassified report

Unedited rough draft trans. of Promyshlennaya Aerodinamike (USSR) n23 p174-99 1962. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Annular nozzles, Jets), (*Jets, Aerodynamic characteristics), Fluid dynamic properties, Surfaces, Pressure, Distribution, USSR.

In the article an attempt is made to clear up by the experimental method the aerodynamic characteristics of annual nozzles and to investigate the flow of an annular jet impinging on a flat screen. An object was to determine the pressure, both along the bottom of the annular nozzle and over the screen, on which the annular jet impinges.

AD-614 801 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Midwest Research Inst., Kansas City, Mo.
RESEARCH ON PANEL FLUTTER.
Final technical rept.,
by Ronald O. Stearman. Dec 64, 43p
Contract AF49 638 1324, Proj. 9782, Task 978201
AFOSR 65-0247

Unclassified report

Descriptors: (*Panels (Structural), Models (Simulations)), (*Flutter, Panels (Structural)), Stability, Supersonic flow, Cylindrical bodies, Loading (Mechanics), Boundary layer control systems, Electroforming, Design, Ogives, Stresses.

The theoretical approach to the thin shell panel flutter studies was extended to include an experimental program. The basic objective of this program is concerned with the influence of an external flow field on the stability characteristics of thin cylindrical shells. The significant accomplishments attained during the year's research effort include the design and fabrication of a cylindrical shell flutter model, its supporting instrumentation, and a thin shell electroforming facility for fabricating the flutter shells. These combined accomplishments will permit a first correlation of experimental shell stability studies at the lower supersonic Mach numbers. (Author)

AD-614 837 Div. 9

Engineering Research Associates, Toronto (Ontario).
THREE-DIMENSIONAL FREE-SURFACE EFFECTS ON HYDROFOILS,
by J. R. Richardson. Mar 65, 51p
Rept. no. ERA-53-1
Contract NObs90084, Proj. SS600, Task 1703

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Hydrofoils, Theory), Vortices, Hydrodynamics, Cavitation, Thickness, Surfaces, Lift, Three-dimensional flow, Transformations (Mathematics), Motion, Integration, Canada.

The report presents the first stage in the development of a three-dimensional theory for thin hydrofoils. The manner in which a foil can be built-up of doublets (representing thickness) and horseshoe vortices (representing lift) is described. The first step must therefore be to find the effect of the free-surface on the flow caused by doublets and vortices. The problem was not approached directly due to difficulties with the boundary conditions for moving disturbances. Instead, an analysis was made of a stationary source with oscillating strength. The results for pulse and step sources are then obtained from the oscillating case by Fourier transforms. Finally the pulse and step sources are integrated along the path of motion to obtain the required moving disturbances. The boundary conditions at great distances from the disturbance are automatically satisfied when this process is used. Equations are presented for the effect of the free-surface (at any Froude number) on the supervelocities caused by a moving doublet and horseshoe vortices oriented in vertical and lateral planes. The form of these equations was arranged so that computation is as easy as possible. (Author)

AD-614 838 Div. 9

Engineering Research Associates, Toronto (Ontario).
STUDIES OF THE NOSE SHAPE OF HYDROFOIL PROFILES WHICH HAVE A WIDE NON-CAVITATING INCIDENCE RANGE,
by J. R. Richardson. Mar 65, 27p
Rept. no. ERA-53-2
Contract NObs90084, Proj. SS600, Task 1703

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Hydrofoils, Configuration), Cavitation, Design, Lift, Pressure, Velocity, Surfaces, Thickness, Hydrodynamics, Angle of attack, Effectiveness, Performance (Engineering), Integral equations, Mathematical analysis, Canada.

Cavitation on thin hydrofoils can be delayed to a high speed by using profiles which produce the lowest maximum fluid velocities on their surface. Such profiles usually have constant velocity distributions over much of the surface, thus avoiding peaks. However these profiles are efficient only for a narrow range of lift coefficients, and are therefore not suitable for rough water operation where changes in incidence lead to peak velocities near the leading edge. Profiles were designed for operating in a seaway by relaxing the optimum conditions at the design lift coefficient in order to obtain as wide an incidence range as possible. The leading edges of these sections appeared to be sharp, but were not defined accurately by the theory. Further studies of these profiles are given. The studies were restricted to uncambered sections with fore - and - aft symmetry. It is shown that exact linear theory leads to a negative thickness at the nose, which is physically impossible. However, a finite nose radius results when non-linear theory is used in the analysis of the leading edge region. The resultant thin profiles have a much greater incidence range than thin conventional foil sections. (Author)

AD-614 877 Div. 9

Michigan Univ., Ann Arbor.
THE EFFECT OF LONGITUDINAL OSCILLATIONS ON FREE CONVECTION FROM VERTICAL SURFACES,
by Siavash Eshghy, V. S. Arpaci, and J. A. Clark.
10 Jun 64, 11p
Grant NSF G9386
ARL 65-81

Unclassified report

Prepared for presentation at the Winter Annual Meeting of the American Society of Mechanical Engineers, New York, 29 Nov-3 Dec 64.

ASME Paper no. 64-WA/APM-33.
Pub. in Journal of Applied Mechanics, Transactions of the ASME p1-9 1964 (Copies not available to DDC or Clearinghouse customers).
Revision of manuscript submitted 16 Jul 63.

Descriptors: (*Heat transfer, Oscillation), (*Convection, Heat transfer), Boundary layer, Vibration, Heat transfer coefficients, Cylindrical bodies, Numerical analysis, Differential equations.

The free-convection flow along a vertical plate oscillating in its own plane is given analytical treatment. The basic equations of boundary-layer flow and heat transfer are linearized and the first three approximations are considered. Heat-transfer measurements are made for a vertical cylinder in air. It is found that in the laminar regime the average coefficient of heat transfer experiences a slight decrease relative to its measured steady state value. For higher values of oscillatory velocity amplitude the average coefficient of heat transfer undergoes an increase over its measured steady-state value. This reversal in the behavior of average coefficient of heat transfer appears to be due to flow transition which is confirmed by smoke studies along a vertical cylinder.

AD-614 893 Div. 9, 12
CFSTI Prices: HC$2.00 MF$0.50

Chrysler Corp., Huntsville, Ala.
PROBLEMS OF LIQUID BEHAVIOR IN WEIGHTLESS ENVIRONMENTS,
by S. A. Kallis, Jr. 30 Apr 65, 26p
Technical rept. no. HEC-R108
Unclassified report

Descriptors: (*Fluid mechanics, Weightlessness), (*Weightlessness, Fluid mechanics), Astronautics, Liquids, Electrolytes, Food, Liquid rocket fuels, Sloshing, Control systems, Pneumatic systems, Surface tension, Capillary tubes, Molecular association.

Contents:
Real systems
Electrolyte Behavior
Propellant Behavior
Foodstuff Behavior
Positive Control of Liquids in Zero g
Use of Ullage Rockets
Use of Pneumatic Force
Use of Surface Tension
Quasi-Mechanical Control
Capillary Control
Molecular Control
Research and development areas.

AD-614 916 Div. 9
CFSTI Prices: HC$3.00 MF$0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A DIFFERENCE SCHEME FOR TWO-DIMENSIONAL UNSTEADY PROBLEMS OF GAS DYNAMICS AND COMPUTATION OF FLOW WITH A DETACHED SHOCK WAVE,
by S. K. Godunov, A. W. Zabrodyn, and G. P. Prokopov.
1965, 52p
TT 65-62097
Unclassified report

Raznostnaya Skhema dlya Dvumernykh Nestatsionarnykh Zadach Gazovoi Dinamiki i Raschet Obtekaniya s Otoshedshei Udarnoi Volnoi, trans. of Zhurnal Vychislitel'noi Matematiki i Matematicheskoi Fiziki (USSR) v1 n6 p1020-50 1961.

Descriptors: (*Gas flow, Numerical analysis), (*Two-dimensional flow, Shock waves), Axially symmetric flow, Difference equations, Iterative methods, Stability, USSR.

AD-614 929 Div. 9, 15
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
NONUNIFORM STEADY FLOW OF AN IDEAL FLUID PAST AIRFOILS. PART II. APPROXIMATE THEORY FOR THIN AIRFOILS IN EXPONENTIAL FLOW,
by J. Weissinger. Jan 65, 44p
Technical summary rept. no. MRC-TSR-536
Contract DA11 0220RD2059
Unclassified report

Descriptors: (*Airfoils, Theory), (*Fluid mechanics, Airfoils), Vortices, Velocity, Numerical analysis, Integral equations.

A theory analogous to that given by Riegels for thin profiles in uniform flow is developed for flows of exponential type U(y) = ae(cy) + be(-cy). By this method the velocity distribution of any profile with moderate thickness and small camber can be calculated approximately by solving the integral equation of the flat plane airfoil - as described in Part I (AD-610 445) and by numerical integration of known functions. Formulas for the corresponding lift and moment are derived. (Author)

AD-614 943 Div. 9
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROBLEMS OF PLATE FLUTTER IN NONLINEAR ARRANGEMENT,
by R. D. Stepanov. 15 Apr 65, 15p FTD-TT-64-596
TT 65-62132
Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Mashinostroenie (USSR) n12 p46-54 1960.

Descriptors: (*Flutter, Flat plate models), (*Aeroelasticity, Flutter), Supersonic flow, Boundary layer, Deformation, Differential equations, Oscillation, USSR.

Results are given of numerical integration of a system of nonlinear differential equations of autooscillation of a plate with consideration of factors, characterizing the geometric and aerodynamic nonlinearity.

AD-614 983 Div. 9, 15
CFSTI Prices: HC$1.00 MF$0.50

Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
VORTICITY DISTURBANCES IN A SHEAR FLOW,
by Donald Koppel. 12 Mar 65, 19p
Technical rept. no. TR-117, CU-141-65-ONR-266-Phys
Contract Nonr26684
Unclassified report

Descriptors: (*Fluid flow, Shear stresses), (*Vortices, Distortion), (*Differential equations, Fluid flow), Turbulence, Damping, Pressure, Viscosity.

A basic fluid flow wherein the vortex lines are stretched by the shear flow is defined. The small-disturbances from this basic flow are considered and

the resulting set of equations reduced to an ordinary linear second order differential equation. This differential equation is solved in various limiting cases. The case of vortex-line stretching is compared with the case when such stretching is absent. (Author)

AD-615 007 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Ohio State Univ., Columbus.
AN EXPERIMENTAL INVESTIGATION OF THE SURFACE PRESSURE DISTRIBUTION ON A CYLINDRICALLY BLUNTED FLAT PLATE AT MACH NUMBERS OF 10 AND 16.
Final technical rept. for 15 Jan 62-15 Nov 64,
by W. Burggraf and R. J. Shanahan. Mar 65, 44p
Contract AF33 657 8106, Proj. 7065, Task 706503
ARL 65-45

Unclassified report

Descriptors: (*Hypersonic flow, Blunt bodies), (*Blunt bodies, Hypersonic flow), (*Flat plate models, Hypersonic flow), Aerodynamic loading, Hypersonic wind tunnels, Reynolds number, Angle of attack, Aerodynamic characteristics.

A cylindrically blunted flat plate was tested in the Aerospace Research Laboratories 30-inch hypersonic wind tunnel at M = 16 and at Reynolds numbers from 3,000 to 25,000 based on leading edge diameter. The flat plate was equipped with interchangeable leading edges of 1/8, 1/4, and 1/2 inch diameter to examine this range of Reynolds numbers and to allow pressure measurements to S/D = 100. Angle of attack was varied from 0 to 10 degrees compression for the test sequence. In addition, surface pressure data were obtained on a 1/8 inch thick flat plate in the ALOSU (Aerodynamic Laboratory of The Ohio State University) 12-inch hypersonic wind tunnel at M = 10 and Reynolds numbers ranging from 600 to 1200 based on leading edge diameter. Angle of attack was varied from 10 degrees expansion to 10 degrees compression for the test sequence. (Author)

AD-615 008 Div. 9
CFSTI Prices: HC$4.00 MF$0.75

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
HYPERSONIC FLOW FIELD ABOUT A BLUNT SLAB WING AT ANGLE OF ATTACK: PHASE I,
by Robert J. Polutchko. Dec 64, 111p
Contract AF33 616 7818, Proj. 7064
ARL 64-213

Unclassified report

Descriptors: (*Hypersonic flow, Blunt bodies), (*Blunt bodies, Hypersonic flow), Wing-body configurations, Aerodynamic characteristics, Angle of attack, Two-dimensional flow, Shock waves, Boundary layer, Thickness, Schlieren photography, Flow visualization, Flat plate models.

This report describes an experimental research program to investigate the flow fields about blunt nosed wings and bodies at angle of attack. Phase I is an investigation of the inviscid two-dimensional flow field about a blunt nosed flat plate and a larger transverse cylinger-plate at a Mach number of 7.6 and angles of attack up to 40 degrees. By traversing the flow between the wing and the bow shock at various chordwise stations with a pitot probe, the streamline patterns and the flow property variations along them are established for each angle of attack. Also included are schlieren photographs of the shock wave shapes, estimates of the boundary layer thicknesses, and the results of a brief investigation to determine the feasibility or an experimental method of sonic line location. (Author)

AD-615 032 Div. 9
CFSTI Prices: HC$1.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
EXPERIMENTAL DETERMINATION OF THE FORCES ON SUPERCAVITATING HYDROFOILS WITH INTERNAL VENTILATION,
by N. L. Ficken, Jr. and G. F. Dobay. Jan 63,
25p Rept. no. 1676
Proj. S-F013 02 01

Unclassified report

Descriptors: (*Hydrofoils, Cavitation), (*Cavitation, Hydrofoils), Ventilation, Gas flow, Lift, Drag, Velocity, Pressure, Tests, Design, Hydrofoil boats, Hydrodynamics, Force (Mechanics).

An investigation is in progress to develop techniques for using internal ventilation to produce very low cavitation numbers at low and moderate speeds. A nondimensional coefficient, the ventilation index, was defined. It was found that the cavitation number based on measured cavity pressure behaves differently for ventilated flows at speeds in the supercavitating regime and at speeds in the subcavitating regime. In both cases, however, the measured cavitation number is related directly to the ventilation index and is relatively insensitive to angle of attack. At high values of the ventilation index (about 0.19 for tests of the 5-term foil reported), the lift and drag coefficients become constant at values appropriate to zero cavitation number. Methods for relating the lift and drag coefficients for various ventilating airflow rates to the appropriate cavitation number are presented for the two speed ranges. Discrepancies exist between the results obtained from high- and low-speed ventilated tests. (Author)

AD-615 131 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Hydronautics, Inc., Laurel, Md.
THE SHAPE OF CAVITIES IN SUPERCAVITATING FLOWS,
by Marshall P. Tulin. Apr 65, 38p
Technical rept. no. TR-121-5
Contract Nonr343500

Unclassified report

Presented in Abridged form at the International Congress for Theoretical and Applied Mechanics (11th), Munich, Sep 64.

Descriptors:(*Cavitation, Two-dimensional flow), Perturbation theory, Drag, Gravity, Models (Simulations), Hydrodynamics, Wake, Boundary value problems.

The shape of cavities in two-dimensional, steady supercavitating flows is discussed. Some new finite cavity models are described; these models feature cavity termination in spiral vortices followed by trailing wakes whose thickness is proportionate to the drag coefficient of the forebody. Linearized theory, together with point forebodies, is used to derive simple relations between drag, cavitation number and cavity length. The case of a dragless forebody is also considered and the cavity length is shown to depend upon the second moment of the distributed drag. The influence of both longitudinal and transverse gravity fields on the flow past a body producing drag is discussed. It is shown that in all cases the cavity is caused to be finite. In the case of the transverse field, the cavity is shown to be of a length which corresponds to a Froude number, and it is deflected over its mid-part in the same direction in which gravity acts. (Author)

10. Fuels and Combustion

AD-614 656 Div. 10, 27
CFSTI Prices: HC$1.00 MF$0.50

Catholic Univ. of America, Washington, d. c. stress Analysis Lab.
AN EXPERIMENTAL STUDY OF STRESSES AT THE INTERFACE OF PROPELLANT GRAINS AND MOTOR CASES DUE TO THERMAL LOADING OF THE SHRINKAGE TYPE.
Progress rept. no. 1,
by A. J. Durelli and V. J. Parks. Feb 65, 6p
Contract AF04 611 10378, Proj. 4 142 000 02
Unclassified report

Descriptors: (*Rocket propellant grains, Surface properties), (*Rocket cases, Solid rocket propellants), (*Solid rocket propellants, Stresses), Bonding, Contraction, Photoelasticity, Photographic analysis, Simulation, Rubber, Models (Simulations), Steel.

The objective of the research program is the experimental study of stresses present at the interface between solid propellant rocket grains and their motor cases due to thermal loading of the shrinkage type. Of particular concern are the stresses at the end of the bonded interface between grain and case. The proposed approach of the program consists of photoelastic analysis of two- and three-dimensional models of the solid-propellant rocket grain shapes when subjected to shrinkage while bonded to a motor case. It is planned to analyze a number of two-dimensional shapes of the meridian cross-section of the grain and, from these, choose the most informative for the more elaborate three-dimensional analysis. With the use of these two-dimensional models an attempt is made to simulate in an approximate way the stress and strain distribution found in the more elaborate three-dimensional models. In the program reported here, a number of urethane rubber models were cast and shrunk on steel strips with various cross-sections.

AD-614 694 Div. 10
CFSTI Prices: HC$2.00 MF$0.50

Bureau of Mines, Pittsburgh, Pa. Explosives Research Center.
FIRE AND EXPLOSION HAZARDS OF FLIGHT VEHICLE COMBUSTIBLES.
Final rept. for 2 Jan 64-2 Jan 65,
by E. L. Litchfield and H. E. Perlee. Mar 65, 29p
Contract AF33 615 64 1007, Proj. 6075, Task 607504
APL TR-65-28
Unclassified report

Descriptors: (*Explosive materials, Sensitivity), (*Liquid rocket propellants, Explosions), (*Fuels, Flammability), (*Liquefied gases, Explosions), (*Halogenated hydrocarbons, Flammability), Solidified gases, Hydrogen, Oxygen, Vapors, Impact shock, Fuel additives, Combustion products, Toxicity, Fire safety, Deflagration, Detonations, Autoignition.

The sensitivity liquid hydrogen + solid oxygen + diluent and liquid oxygen + solid hydrocarbon + diluent, was investigated employing a projectile impact to determine the shock required to detonate these mixtures. With no diluent, each explosive system is initiated by a shock stimulus of 1.0 to 2.5 kbar. The explosive yields are such that 1-lb cryogenic mixture is equivalent to 0.6 to 2.0 lb TNT. Sodium chloride, nitrogen, and methyl chloride had inert desensitizing effects upon the liquid hydrogen mixtures but did not reduce the explosive yield. Sodium chloride and nitrogen desensitized the liquid oxygen system; sodium chloride or water reduced the explosive yield of this system. Large volumes of detonable, gaseous hydrogen-oxygen mixtures would result from a massive spill of liquid hydrogen-liquid oxygen. Inhibition of detonation initiation by dry powder particle additives was investigated. The powder additives produced insignificant inhibition in comparison to that produced by gaseous diluents. Flammability limit determinations of four additional halogenated hydrocarbons are included in a discussion of the characteristics of 10 such compounds. Most of the compounds were flammable in oxygen atmospheres at temperatures below 200F; their combustion products included toxic halogens or halogen halides. (Author)

AD-614 795 Div. 10
CFSTI Prices: HC$1.00 MF$0.50

Philco Research Labs., Newport Beach, Calif.
THERMODYNAMIC PROPERTIES OF PROPELLANT COMBUSTION PRODUCTS.
Quarterly letter rept. no. 2, 15 Jul-15 Sep 64,
by D. L. Hildenbrand. 15 Sep 64, 6p Pub. no. QLR-64-15
Contract AF49 638 1397, ARPA Order 317, Task 13
Unclassified report

See also AD-612 361.

Descriptors: (*Propellants, Combustion products), (*Combustion products, Propellants), (*Halides, Alkaline earth compounds), (*Alkaline earth compounds, Halides), Fluorides, Chlorides, Boron compounds, Barium compounds, Strontium compounds, Cadmium compounds, Mass spectroscopy, Heat of sublimation, Entropy, High-temperature research, Thermodynamics.

The objective of this program is to provide thermodynamic data for species which are potentially important combustion products of advanced chemical propulsion systems. Heat of formation and entropy data for species of interest are obtained from equilibrium studies carried out by effusion and free evaporation methods and by high-temperature mass spectrometry. (Author)

AD-614 805 Div. 10, 4
CFSTI Prices: HC$2.00 MF$0.50

Midwest Research Inst., Kansas City, Mo.
STRUCTURAL STUDIES OF INORGANIC OXIDIZERS.
Quarterly rept. no. 3, 1 Jan-Mar 65.
31 Mar 65, 34p
Contracts AF04 611 10215, AF04 611 9372, Proj. 2790C, ARPA Order 24
Unclassified report

See also AD-610 595.

Descriptors: (*Oxidizers, Molecular structure), (*Solid rocket oxidizers, Molecular structure), (*Nitrogen compounds, Fluorides), (*Oxygen compounds, Fluorides), Nuclear magnetic resonance, Photochemistry, Synthesis (Chemistry), Purification, Free radicals, Spectra (Visible and ultraviolet).

It was established that OF2 dissociates photolytically into a paramagnetic species in which there is a hyperfine interaction between the unpaired electron and one fluorine nucleus. The radical was characterized by means of the EPR spectrum, but not identified. However, the characteristics of the spectrum indicate that the radical is OxF., rather than F. . It is highly probable that the same OxF. radical exists in the higher oxygen fluorides and, indeed, may be the basic structural unit for synthesizing OxFy and related compounds. The interaction of the photolytic OF2 species in NF3 (liquid) solvent results in a destruction of the paramagnetic entity rather than a stabilization. This is further evidence that photolysis of OF2 produces a radical rather than an ion species.

AD-614 821 Div. 10
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
PORTABLE DETECTOR FOR MIXED HYDRAZINES PROPELLANT FUEL VAPORS AT LOW CONCENTRATION.
Final rept.,
by E. I. Smith, Jr. and H. E. Moran, Jr. Apr 65, 16p
Memorandum rept. no. MR-1602
Projs. SF015 07 02 3350, RR001 01 43 4650,
Task RMMP24 016 6521F009 06 11

Unclassified report

Descriptors: (*Hydrazine, Colorimetric analysis), (*Methyl hydrazines, Colometric analysis), (*Rocket propellants, Colorimetric analysis), (*Chemical indicators, Aldehydes), Vapors, Samplers, Amines, Monocyclic compounds, Impurities, Ammonia, Carbon dioxide, Chlorine, Sulfur compounds, Dioxides.

Paradimethylaminobenzaldehyde (DMABA) was examined as a color forming agent for the colorimetric determination of mixed hydrazines propellant fuel vapor in air. Contaminated air was drawn through a filter paper disc which had been moistened with DMABA solution. The reaction between the fuel vapor and the indicator produced a yellow color. Air was drawn through the indicator until the yellow color matched an arbitrarily selected standard yellow color. The volume of air required to produce the standard color was related to the concentration of fuel vapor in the air over the range of 0.5 to 10 ppm. Several gases which might be found in the air at least occasionally were examined for interference with the fuel vapor test. Ammonia at 50 ppm did not interfere, but higher concentrations either decreased the indicator sensitivity or completely inhibited color formation. Sulfur dioxide at 500 ppm did not interfere with the test; higher concentrations did interfere. Carbon dioxide at concentrations up to 50,000 ppm (5%) did not affect the test. Chlorine at 2 and 5 ppm reduced the sensitivity of the test indicator. Fifty ppm and higher concentrations of chlorine formed brown or green colors with the indicator, thus interfering with the fuel vapor test. (Author)

AD-615 036 Div. 10, 4
CFSTI Prices: HC$3.00 MF$0.50

Du Pont de Nemours (E. I.) and Co., Inc., Wilmington, Del. Electrochemicals Dept.
STABILITY OF HIGH STRENGTH H2O2.
Quarterly rept. no. 2 for period ending 31 Mar 65.
31 Mar 65, 51p
Contract AF04 611 10216

Unclassified report

See also AD-610 853.

Descriptors: (*Oxidizers, Stability), (*Hydrogen peroxide, Stability), Decomposition, Electrical conductance, Reaction kinetics, Chemical equilibrium, Nuclear magnetic resonance, Photochemistry, Ion exchange resins, Fluorine compounds, Sulfonates, Compatibility.

A series of stability tests on samples of commerical ('stabilized') 90% and 98% hydrogen peroxide at -60C., -30C., and OC., in Pyrex glass, was completed. It is concluded that present commercial grades of 98% and some commercial grades of 90% hydrogen peroxide, maintained at OC. or below, can be considered stable and storable (decomposition rates below 1±0.5 ppm/day). A detailed analysis of previous studies of the mechanism of catalytic decomposition of hydrogen peroxide was completed, and used to formulate a coherent series of reaction steps for such decompositions. Electron paramagnetic resonance studies were carried out in a rapid flow mixing chamber in order to determine the rate constants for some dozen initiation and propagation reactions of these highly transient intermediate species. Attenuated total reflectance measurements were made on a perfluorosulfonic acid ion exchange membrane exposed to 90% hydrogen peroxide at 70C. Definite attack on the membrane was shown in a two hour period, indicating that not all perfluoro organic compounds are inert to 90% hydrogen peroxide.

AD-615 103 Div. 10
CFSTI Prices: HC$3.00 MF$0.75

Utah Univ., Salt Lake City. Dept. of Chemical Engineering.
IGNITION AND COMBUSTION OF SOLID PROPELLANTS.
Technical rept. for 1 Oct 63-30 Sep 64,
by John A. Keller, Alva D. Baer, and Norman W. Ryan.
30 Sep 64, 74p
Grant AF AFOSR40 64
AFOSR 65-0936

Unclassified report

See also AD-605 729.

Descriptors: (*Solid rocket propellants, Ignition), (*Combustion, Solid rocket propellants), (*Ignition, Solid rocket propellants), Surface properties, Heat transfer, Burning rate, Catalysts, Flame propagation, Ammonium compounds, Perchlorates, Gas flow, Carbon black, Solid rocket propellent binders, Combustion products, Polymers, Decomposition, Rocket igniters.

The results of the study of propellant ignition by high convective heat fluxes have shown that the gas velocity effect often observed in convective heating tests can be attributed to surface roughness. If this surface roughness effect is eliminated by the use of very smooth propellant surfaces or by use of very high gas velocities which prevent ignition of projections on the surface, the relationship between ignition time and surface heat flux is simply the extrapolation of the low-flux ignition data. Also, it appears that the effect of a burning rate catalyst is to increase the rate of reaction of propellant-component decomposition products at the propellant surface. Modification of the thermal ignition theory to include the effects of surface regression for high igniter heat fluxes has lead to results which indicate that an ignition-pressure effect on the overall ignition process can be observed with practical ignition systems even when the thermal response of the propellant itself is independent of pressure. The problem of transition from ignition to steady-state burning can be approximately treated by this model. The results of a re-evaluation of the hot-wire ignition technique have been encouraging. It is possible to accurately measure ignition times from 10 msec to 10 sec, and these results are comparable to data from low flux radiation tests. (Author)

AD-615 170 Div. 10, 1
CFSTI Prices: HC$6.00 MF$1.25

North American Aviation, Inc., Los Angeles, Calif.
SUPERSONIC TRANSPORT. PERFORMANCE OF CURRENT QUALITY COMMERCIAL JET FUEL IN THE SUPERSONIC TRANSPORT AIRFRAME AND AIRCRAFT ENGINE FUEL SYSTEM TEST RIG.
Final rept.
14 May 65, 209p Rept. no. NA65-247
Contract FA SS65 3
FAA SST-65-5

Unclassified report

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Descriptors: (*Jet engine fuels, Transport planes), (*Transport planes, Supersonic planes), Environmental tests, Performance (Engineering), Test equipment, Engine fuel systems components, Airframes, Effectiveness, Flight simulators.

The SST Airframe and Aircraft Engine Fuel System Test Rig was developed, designed and constructed under Coordinating Research Council Contract No. CA-34-61 as a means toward obtaining data to determine the effect of the airframe and aircraft engine fuel system environment on fuel quality requirements in the commercial supersonic transport. A total of five test series was conducted using two ASTM Type A Jet Fuels and one JP-5 Referee Jet Fuel. These tests were conducted at CRC environmental conditions representative of a 3500 nautical mile flight mission under Mach 3 or Mach 2.5 speed. The test results indicated no evident problem areas under the Mach 2.5 environmental conditions. The problem areas encountered under the four Mach 3 test series included the presence of deposits in the wing and fuselage tanks and vent lines, partial plugging of the engine fuel system filter, heat exchanger, and nozzle, and loss of heat transfer efficiency in the engine heat exchanger. (Author)

11. Ground Transportation Equipment

No entries

12. Guided Missiles

AD-614 564 Div. 12, 8
CFSTI Prices: HC$2.00 MF$0.50

Picatinny Arsenal, Dover, N. J.
A 200-SECOND SETTABLE MAGNETIC CORE TIMER,
by Douglas L. Dickerson. Feb 65, 29p
Technical rept. no. TR-3225
Unclassified report

Descriptors: (*Timing devices, Magnetic cores), (*Magnetic cores, Timing devices), Capacitors, Timing circuits, Failure (Mechanics), Oscillators, Manufacturing methods, Models (Simulations), Guided missile warheads.

The application of magnetic cores as major components in a settable timer for missile environment was investigated and prototype models developed. The timer consists of a temperature-stabilized 1000-cycle L-C oscillator accurate to 0.1%, a magnetic-core counter in double line shift register mode, and a remote selection unit. Time delays from 1 to 200 seconds can be obtained with a setting resolution to 0.1 second. Maximum error is 0.1% of the time selected over an operating temperature range from -65F to +165F. Size of the timer package is projected to be less than 10 cubic inches while power consumption is less than 40 milliwatts with a power source of 5.6 volts ±10%. The count state of the system is defined by the direction of remanent magnetism in the magnetic cores and, therefore, is not altered by the loss or absence of power-supply voltage. Sufficient energy will remain in the capacitors to complete any data transfer already under way at the time of failure. The remote selection system eliminates the need for circuit power while the time delay is being selected. The time delay selected can be stored without standby power for an indefinite length of time because of magnetic storage. (Author)

AD-614 652 Div. 12, 5, 18
CFSTI Prices: HC$2.00 MF$0.50

Rome Air Development Center, Griffiss AFB, N. Y.
A METHOD FOR CONTROLLING THE ATTITUDE OF A SATELLITE USING THE EARTH'S MAGNETIC FIELD,
by Wilfred Joseph Minkus. Sep 64, 36p
RADC TDR-64-394
Proj. 4519, Task 451901
Unclassified report

Descriptors: (*Attitude control systems, Satellites (Artificial)), (*Satellites (Artificial), Attitude control systems), (*Magnetic guidance, Attitude control systems), Terrestrial magnetism, Circular orbit trajectories, Magnetic moments, Moment of inertia, Torque, Communication systems, Air force research, Astronautics, National defense.

The report investigates a means of controlling the attitude of a satellite in a circular orbit about the earth by the torque due to the interaction between the earth's magnetic field and the magnetic moments produced by currents in three orthogonal coils aboard the satellite. This system has the advantage over more conventional ones in that no mass is expended in the control process. It is designed to rotate the satellite about its longitudinal axis in a minimum amount of time while limiting the deviation of this axis from the local normal to the earth. The analysis is limited to the period during which the satellite's attitude is being changed by magnetically produced torques. When these torques are not applied, gravity gradient effects act as a restoring force to align the longitudinal axis with the local normal to the earth. The method is applicable to a satellite with symmetry such that the moment of inertia about its longitudinal axis is much smaller than those about body-fixed axes lying in a plane perpendicular to it and whose moments of inertia about axes in this plane are approximately equal. The model of the earth's magnetic field that is used is a dipole with its poles located at the observed geographical positions. The control system is developed to be applicable to the general type of satellite indicated above and to all orbits except those passing close to the magnetic poles. It is then applied to a particular satellite and type of orbit of interest to RADC. (Author)

AD-614 699 Div. 12, 30

Naval Ordnance Lab., White Oak, Md.
AN IBM 7090 SIX-DEGREE-OF-FREEDOM TRAJECTORY PROGRAM,
Aerodynamics Research rept.,
by W. E. DeGrafft. 9 Feb 65, 66p
Rept. no. ARR-237, NOLTR-64-225
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
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Descriptors: (*Programming (Computers), Guided missile trajectories), (*Guided missile trajectories, Programming (Computers)), Aerodynamic characteristics, Ballistics, Stabilization systems, Spin, Programming languages.

This report presents a six-degree-of-freedom trajectory program which describes the unpowered flight of a rigid body in the vicinity of a spherical rotating earth. The program is written for an IBM 7090 computer operating under the IBSYS monitor. The mathematical formulation of the problem and the computer program itself are presented. The program description includes a FORTRAN listing and instructions for its use. (Author)

AD-614 710 Div. 12, 2
CFSTI Prices: HC$2.00 MF$0.50

Naval Weapons Lab., Dahlgren, Va.
BALLISTIC CORRELATION ALTITUDES FOR RE-ENTRY WINDS AND NONSTANDARD AIR DENSITIES,
Technical memo,
by Doreen H. Daniels. Apr 65, 38p Rept. no. K-49/65
Unclassified report

Descriptors: (*Reentry vehicles, Guided missile trajectories), (*Guided missile trajectories, Wind), Guided missiles (Surface-to-surface), Radiosondes, Analysis, Density, Air, Ballistics.

The memorandum gives the results of a limited analysis of typical rawinsonde data made to determine if there is an altitude or pressure level at which the density and wind correlate with total ballistic densities and winds. This analysis was made for two theoretical ballistic missiles, having typical re-entry shapes, and employed 100 individual rawinsondes, representing all months of the year, obtained at stations representing wide geographic distribution. (Author)

AD-614 764 Div. 12, 15

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE STABILITY OF MOTION OF ARTIFICIAL

MOON SATELLITES (K Voprosu ob Ustoichivosti Dvizheniya Iskusstvennykh Sputnikov Luny),
by G. A. Chebotarev and S. N. Kirpichnikov.
7 Apr 65, 14p FTD-TT-65-106
RAE Trans-1083; TT 65-60672

Unclassified report

Trans. of Akademiya Nauk SSSR. Institut Teoreticheskoi Astronomii. Byulleten 1962 v. 8, no. 6, p402-404.
Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Lunar satellites, Orbital trajectories), (*Orbital trajectories, Lunar satellites), Satellites (Artificial), Integration, Numerical methods, Stability, USSR.

In the paper the motion of four lunar satellites is investigated by numerical integration with the object of elucidating the boundaries of stable motion. The interaction of the gravitational field of the moon with the gravitational field of the earth determines the existence of two spheres which are of direct interest from the point of view of the stability of motion of artificial moon satellites. The first sphere determines the region of space within which the moon's gravity is more powerful than the earth's gravity. The radius of this sphere is given by rho sub 1 = a sub 1 (m sub 2/m sub 1) to 1/2 power = 24.54 lunar radii, where m sub 1 and m sub 2 are the mass of the earth and moon respectively, and a sub 1 is the semi-major axis of the lunar orbit. In the paper the following numerical values have been assumed for these constants: m sub 2/m sub 1 = 1/81.375, a sub 1 = 384,400 Km. The second sphere is the moon's sphere of influence, and its radius is determined by the equation rho sub 2 = a sub 1 (m sub 2/m sub 1) to 2/5 power = 66200 Km = 38.10 lunar radii.

AD-614 827 Div. 12
CFSTI Prices: HC$1.00 MF$0.50

Army Missile Command, Redstone Arsenal, Ala.
RELIABILITY OF GUIDED MISSILES. A LECTURE. Revised ed.,
by Robert Lusser. Jan 59, 16p

Unclassified report

Descriptors: (*Guided missiles, Reliability), Statistical analysis, Design, Manufacturing methods, Maintenance, Tests.

Reliability problems of guided missiles are presented in a form suitable for lecturing to uninitiated audiences. Basic mathematics of reliability are discussed and it is explained how complex missiles may be made reliable by sound principles of design, manufacture, and maintenance. The lecture stresses the need for statistical thinking and points out that by conducting comprehensive reliability programs, vast economic and military returns may be achieved. (Author)

AD-615 043 Div. 12, 30

Lockheed Missiles and Space Co., Sunnyvale, Calif.
SATELLITE SYSTEMS TIMING FORMATS,
by P. Ceccio. 19 Jun 61, 20p
Rept. no. LMSD-918768

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Time, Telemeter systems), (*Telemeter systems, Time), (*Satellites (Artificial), Tracking), Timing devices, Digital recording systems.

This report is to acquaint users with the timing formats in use by Satellite Systems. The details of each time code word presented are compiled from their respective Technical Manuals and Handbooks. Code word titles have originated from lack of an available standard. Information used is current as of the date of issue. There is a demand for time formats that are suitable for recording on magnetic tape, recording oscillographs, film and real time transmissions that also meet the requirements of both manual and automatic data reduction. This demand made it necessary to utilize a number of time systems. The time formats in use by Satellite Systems are listed. A detail description of each format, where and how used, is presented to familiarize and to permit better understanding of the systems available.

AD-615 090 Div. 12, 13
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
DESIGN CRITERIA AND ANALYSES FOR THIN-WALLED PRESSURIZED VESSELS AND INTERSTAGE STRUCTURES.
Technical memo.,
by T. J. Hart. 26 Jun 59, 50p
Rept. no. LMSD-311623

Unclassified report

Descriptors: (*Pressure vessels, Design), (*Structure shells, Design), Structures, Mathematical analysis, Thickness, Stresses, Propellant tanks, Safety, Failure (Mechanics), Loading (Mechanics), Buckling (Mechanics), Compressive properties, Graphics, Weight.

This report considers the problem of varied philosophies of design criteria in the missiles and spacecraft industry in relation to preliminary design work. The report offers a set of design ground-rules consistent with safety factors and materials allowable as an effective approach not only for structural preliminary design but also for general application by the structural design analyst. Specific uses involving design of thin-walled pressurized vessels and interstage structures are presented. Criteria with respect to factors of safety and use of buckling probability curves are included for structures in which a buckling type of failure under axial compression predominates. Formulae for determining gages for tanks and interstages are given and a set of graphs is provided which permits rapid calculation of the weights of tanks. The report also contains a graph which shows the weight penalty incurred for tanks which deviate from a spherical shape, and there is a graph presenting the volume of a tank as a function of the diameter. Critical axial compressive stress coefficients for different philosophies of structural design are graphically illustrated and curves for allowable load versus thickness based on these philosophies are presented. (Author)

AD-615 120 Div. 12, 9
CFSTI Prices: HC$1.00 MF$0.50

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
THEORETICAL INVESTIGATIONS OF THE DYNAMICS OF BODIES ENTERING THE ATMOSPHERE.
Final technical rept.,
by B. Etkin. Feb 63, 6p
Grant AF AFOSR62 40
AFOSR 4553

Unclassified report

See also AD-272 996.

Descriptors: (*Atmosphere entry, Dynamics), (*Astronautics, Atmosphere entry), Mathematical

prediction, Digital computers, Satellites (Artificial), Trajectories, Celestial mechanics, Flight simulators.

The research was part of a long term program of research on flight dynamics of artificial satellites. Topics discussed in this report are reentry flight paths, satellite dynamics, and flight simulators.

AD-615 154 Div. 12, 15, 27
CFSTI Prices: HC$1.00 MF$0.50

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
SEVERAL TRAJECTORY OPTIMIZATION TECHNIQUES. PART I: DISCUSSION,
by R. E. Kopp and R. McGill. 1963, 25p
Rept. no. GRD-119, pt. 1
Contracts AF49 638 1207, NAS8 1549
Unclassified report

Appeared in Computing Methods in Optimization Problems edited by A. V. Balakrishnan and Lucien W. Neustadt, p65-89, Academic Press, 1964.

Descriptors: (*Ion engines, Transfer trajectories), (*Optimization, Transfer trajectories), (*Transfer trajectories, Optimization), Circular orbit trajectories, Thrust, Control, Space propulsion, Calculus of variations, Iterative methods, Numerical analysis, Time, Reduction.

This paper discusses several numerical approaches for solving problems arising in optimizing trajectories. The basic concepts underlying the gradient method, the second variation method, and a generalized Newton-Raphson method are presented in a very elementary manner by considering an ordinary minimum problem with a side constraint. The results obtained when the basic concepts are extended to the variational problem and the computational algorithms are then discussed. Finally, in the concluding remarks, advantages and disadvantages of each method are reviewed, and a comparison is made between the second variation method, which might be considered a direct method, and the generalized Newton-Raphson method, normally considered as an indirect method. Part II of this paper provides an application of the three methods to a specific problem. (Author)

AD-615 155 Div. 12, 15, 27
CFSTI Prices: HC$1.00 MF$0.50

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
SEVERAL TRAJECTORY OPTIMIZATION TECHNIQUES. PART II: APPLICATION,
by H. Gardner Moyer and Gordon Pinkham. 1963,
15p Rept. no. GRD-119, pt. 2
Contracts AF49 638 1207, NAS8 1549
AFOSR 65-0603
Unclassified report

Appeared in Computing Methods in Optimization Problems edited by A. V. Balakrishman and Lucien W. Neustadt, p91-105, Academic Press, 1964.

Descriptors: (*Ion engines, Transfer trajectories), (*Optimization, Transfer trajectories), (*Transfer trajectories, Optimization), Circular orbit trajectories, Thrust, Space propulsion, Control, Time, Calculus of variations, Iterative methods.

This paper discusses the application of the three optimization methods - steepest descent, second variation, and generalized Newton-Raphson - to the problem of minimum time, low thrust, circle-to-circle transfer. Details of computational techniques that have proved successful in practice are presented. The number of iteration cycles and the time used by the computer are given for each method. (Author)

AD-615 157 Div. 12, 19, 28
CFSTI Prices: HC$3.00 MF$0.75

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
TRAJECTORY VERSUS LINE-OF-SIGHT SPACE RENDEZVOUS USING OUT-OF-WINDOW VISUAL CUES.
Final rept. for Jun-Sep 64,
by Herbert J. Clark. Feb 65, 58p
Rept. no. AMRL TR-65-10
Proj. 7184, Task 718401
Unclassified report

Descriptors: (*Space flight, Simulation), (*Rendezvous trajectories, Space flight), (*Performance (Human), Space navigation), Orbital trajectories, Rendezvous guidance, Spacecraft docking, Fuel consumption, Pitch (Motion), Thrust, Analysis of variance, Factor analysis, Analog computers.

Seven trained subjects flew simulated short range coplanar orbital rendezvous maneuvers, using direct visual cues only. Two rendezvous techniques were compared: line-of-sight and trajectory. In the former, the subject could control up-down and fore-aft thrust only; in the latter, he could, in addition, control pitch. Using either technique, all subjects were able to maneuver successfully to a position 100 ft directly in front of the target at a terminal velocity of less than 5 ft/sec. Significantly, less fuel was expended in performing the trajectory maneuver. The principal man-machine performance factors in the line-of-sight maneuver were tentatively described as (1) the ability to conserve fuel used for longitudinal and vertical translation, (2) the ability to conserve mission time, and (3) the ability to proficiently close with the target. The principal factors for the trajectory maneuver were tentatively described as (1) the ability to conserve fuel for longitudinal translation, (2) the ability to conserve mission time, (3) the ability to effectively apply longitudinal thrusts and conserve fuel used for vertical translation, and (4) the ability to match the trajectory path of a minimum fuel two impulse maneuver. Computer diagrams fully describing the analog simulation are included. (Author)

AD-615 165 Div. 12
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A MATHEMATICAL MODEL OF SUPPLY SUPPORT FOR SPACE OPERATIONS.
Memo.,
by Raoul J. Freeman, David C. Gogerty, Glenn W. Graves, and Robin B. S. Brooks. Apr 65, 28p
RM-4520-PR
Contract AF49 638 70018
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Mathematical models, Logistics), (*Extraterrestrial bases, Logistics), (*Space stations, Logistics), (*Logistics, Mathematical models), Scheduling.

The Memorandum develops a methodology to evaluate various aspects of logistics supply support of space bases. It is assumed that there exists at the space base a schedule of operations which reflects the day-to-day living, build-up, and scientific experimental activities that are to be carried on. These activities, in turn, set

a series of demands or requirements for products over a time spectrum. The supply system must deliver products so as to meet the amounts and times of the product requirements. Each product or module has an earliest and latest time by which it must be delivered. The model plans a series of trips, the dates at which each is to be sent, and the composition of the cargoes on each trip which satisfy the series of requirements over a time spectrum imposed by the activities at thespace base.

The series of trips are an expression of an efficient plan which simultaneously considers demands for different products at different future times and observes the various constraints of the system (e.g., cargo capacity of spaceships). The scheduling model can be used in two different modes: as part of a control system for an actual space base, or as a planning tool to aid in the design of a space base and the formulation of operations schedules.

13. Installations and Construction

AD-614 586 Div. 13
CFSTI Prices: HC$2.00 MF$0.50

New Hampshire Univ., Durham. Dept. of Mechanical Engineering.
DEVELOPMENT OF A METHOD FOR EXPERIMENTAL DETERMINATION OF LOCAL CONVECTIVE COEFFICIENTS FOR AN UNBAFFLED CIRCULAR FIN ASSEMBLY.
Master's thesis,
by Martin Weigner Andersen. Jun 64, 47p
Contract AF33 608 940

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Heat exchangers, Design), (*Fins, Heat exchangers), Heat transfer, Thermal conductivity, Test equipment, Construction.

AD-614 596 Div. 13, 15
CFSTI Prices: HC$2.00 MF$0.50

Princeton Univ., N. J. Dept. of Graphics and Engineering Drawing.
THE USE OF NOMOGRAPHY IN THE SOLUTION OF BEAM-COLUMN PROBLEMS,
by Morris Ojalvo. 23 Mar 65, 27p
Technical Seminar Series rept. no. TSS-15

Unclassified report

Rept. on Engineering Graphics Seminar.

Descriptors: (*Nomographis, Compressive properties), (*Beams (Structural), Compressive properties), (*Compressive properties, Beams (Structural)), Loading (Mechanics), Stresses, Buckling (Mechanics), Elasticity, Failure (Mechanics), Moments.

The pertinent set of conditions for a buckling column when the nature of the equilibrium changes may be expected to include the column length, shape of cross section, mechanical properties of the material, compressive load, and end moment. One of these is selected as an independent parameter while the others are taken as constant for the analysis. The equilibrium configuration is determined for several values of the parameter and sets of curves are obtained by plotting values of parameters against typical displacements or distortions of the deformed column.

AD-614 693 Div. 13, 33
CFSTI Prices: HC$3.00 MF$0.75

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
INFLUENCE DIAGRAMS FOR STRESSES AND DISPLACEMENTS IN A TWO-LAYER PAVEMENT SYSTEM FOR AIRFIELDS. PART I.
Technical rept. no. 1, 15 Apr 57-23 Sep 59,
by Donald M. Burmister. Jan 65, 72p
Contract NBy13009

Unclassified report

Descriptors: (*Landing fields, Pavements), (*Pavements, Stresses), Shear stresses, Deflections, Loading (Mechanics), Reinforcing materials, Reinforced concrete, Asphalt, Laminates, Construction, Design, Deformation, Elasticity, Partial differential equations, Composite materials, Graphics.

Part I presents Influence Diagrams for Stresses and Deflections in Two-Layer Pavement Systems for Airfields, which are intended to provide the essential background and bases for understanding the character and effectiveness of layered system reinforcing action. Influence diagrams of vertical stresses and shear stresses at intervals of depth in layered systems and deflections at the surface are presented covering suitable ranges of the basic two-layer system parameters. The significance of these influence diagrams are discussed with regard to the character and effectiveness of two layer system reinforcing and to their interacting influences on pavement system performances under wheel loads. The major objectives are to develop a 'feeling', intuition, and judgment regarding the nature of vertical stress, shear stress, deflection, and shear deformation phenomena and performances, as essential bases for developing relationships and criteria for design of multilayer pavement systems. (Author)

AD-614 830 Div. 13, 25
CFSTI Prices: HC$3.00 MF$0.50

Illinois Univ., Urbana. Dept. of Aeronautical and Astronautical Engineering.
RESPONSE OF MULTI-SPANNED BEAM AND PANEL SYSTEMS UNDER NOISE EXCITATION.
Summary rept. for Jun-Sep 64,
by Y. K. Lin. Feb 65, 51p
Contract AF33 657 11715, Proj. 7351, Task 735106
ML TR-64-348 P1

Unclassified report

Descriptors: (*Beams (Structural), Acoustics), (*Panels (Structural), Acoustics), (*Acoustics, Structures), Structural parts, Vibration, Noise, Excitation, Statistical processes, Matrix algebra, Fatigue (Mechanics), Failure (Mechanics).

A statistical theory is presented for the stationary and nonstationary response of a system of multispanned beams and a system of multispanned panels under noise excitation. The intermediate supports of the beam and panel systems are, respectively, elastic springs and elastic stringers. The matrices of frequency response functions are obtained from the transfer matrices which represent the mechanism that transmits the displacements and forces at one location of the system to another. The effects of the structural and acoustic dampings and of the acoustic apparent mass are accounted for in the formulation. (Author)

AD-614 892 Div. 13, 2
CFSTI Prices: HC$4.00 MF$1.00

Iowa State Univ. of Science and Tech., Ames.
SIMILITUDE OF DYNAMICALLY LOADED BURIED STRUCTURES.
Rept. for 1 May 62-31 Dec 64,
by Glenn Murphy, D. F. Young, and K. G. McConnell. Mar 65, 130p
Contract AF29 601 5359, Proj. 5710, Task 13 157
WL TR-64-142

Unclassified report

Descriptors: (*Underground structures, Loading (Mechanics)), Model tests, Soils, Sand, Mineral oils, Strain (Mechanics), Soil mechanics, Dynamics, Shock tubes, Stiffened cylinders, Pipes, Test facilities, Models (Simulations), Strain gages, Accelerometers, Deformation.

Results of an investigation to determine similarity requirements for dynamically loaded buried structures are presented. Scaling relationships are developed and

investigated experimentally. Tests were performed with small-scale structures buried at different depths and dynamically loaded in either a drop-weight loader or a shock tube. Hollow tubes instrumented with strain gages and solid blocks instrumented with accelerometers were used as the model structures. Three soil types were utilized in the test program: dry Ottawa sand, dry sand mixed with mineral oil, and a cohesive (Colo) soil. Complete strain-time and acceleration-time curves were obtained at different depths of burial for a series of geometrically similar models and for a series of hollow cylinders of different stiffnesses. A detailed analysis of the data is presented. The results of the test program indicate that reliable predictions, based on the scaling relationships presented in the report, can be obtained for structures buried in dry sand. For more cohesive soils distortion is present and the use of prediction factors is required if the same materials are used in both the model and the prototype. (Author)

AD-614 902 Div. 13, 22
CFSTI Prices: HC$3.00 MF$0.75

Naval Civil Engineering Lab., Port Hueneme, Calif.
MOTION OF SUBSURFACE SOIL INCLUSIONS SUBJECTED TO SURFACE BLAST LOADING.
Rept. for Sep 62-Dec 64,
by L. W. Heller. Apr 65, 58p
Technical rept. no. R-372
Projs. DASA13 018, YF008 08 02 112
Unclassified report

Descriptors: (*Soil mechanics, Explosion effects), (*Underground structures, Explosion effects), Surface burst, Blast, Loading (Mechanics), Sand, Reinforced concrete, Failure (Mechanics), Compressive properties, Engineering geology, Civil engineering, Nuclear explosions.

An experimental investigation was conducted to provide an insight into the fundamental motion characteristics of inclusions buried in a soil field and subjected to a blast loading applied to the surface of the soil. The purpose of the work was to provide knowledge of those factors influencing the failure of an underground protective complex composed of structures, utility lines, communication lines, appurtenances, etc. Dissimilar inclusions, representing elemental portions of a buried complex, were placed at different depths within a dry sand material compacted into a reinforced-concrete container. A sequence of 15 blast loadings at overpressure levels of 5 to 25 psi were applied to the surface of the sand, and the acceleration and displacement of the inclusions and the displacement of the soil were measured. The experimental results indicate that the inclusions do not move with the surrounding soil but displace into the soil in the direction of the propagating soil stress wave. Stiffer inclusions attained the greatest acceleration, velocity, and displacement; inclusion-soil differential displacements of up to one-third the maximum inclusion displacement were recorded. (Author)

AD-614 928 Div. 13
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
LOW BUCKLING STRESSES OF AXIALLY COMPRESSED CIRCULAR CYLINDRICAL SHELLS OF FINITE LENGTH,
by Nicholas J. Hoff. Jul 64, 44p SUDAER-192
Contract AF49 638 1276
AFOSR 64-1317 Unclassified report

Descriptors: (*Structural shells, Stresses), (*Cylindrical bodies, Stresses), Buckling (Mechanics), Deformation, Differential equations, Determinants, Mathematical analysis, Shear stresses.

Exact solutions are derived of the classical differential equations defining the deformations of axially compressed thin-walled circular cylindrical shells. The end conditions along the circular edges are assumed as the vanishing of (1) the radial displacement; (2) of the longitudinal bending moment; (3) of the variation in the axial normal stress, and (4) of the circumferential membrane shear stress. Under these conditions of simple support the critical value of the uniformly distributed axial normal stress is one-half the classical critical value. (Author)

AD-614 948 Div. 13
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COMPARING 'BOILING LAYER' AND 'DENSE LAYER' TYPES OF HEAT EXCHANGERS FOR THE UTILIZATION OF EXHAUST GAS HEAT,
by S. S. Zabrodskii. 13 Apr 65, 21p
FTD-TT-64-1109
TT 65-62137
Unclassified report

Unedited rough draft trans. of Akademiya Navuk BSSR Minsk. Instytut Energetyki. Trudy v2 p162-77 1955.

Descriptors: (*Heat exchangers, Exhaust gases), Heat, Boiling, Heat treatment, Mixtures, Analysis, USSR.

An ideal homogensous boiling layer by thermal potential of unit of volume at identical resistance is considerably more convenient than a dense layer, especially in the zone of fully developed 'boiling'. For thermal processing of real polydispersion materials the boiling layer is more convenient than the dense one, in view of the absence of negative effect of admixtures of thin fractions on the resistance of heat exchangers, thanks to which the necessity of preliminary separation of same is done away with. (Author)

AD-614 990 Div. 13, 20
CFSTI Prices: HC$3.00 MF$0.75

Air Force Weapons Lab., Kirtland AFB, N. Mex.
SIMULATION OF AIR-BLAST-INDUCED GROUND MOTION, PHASE I.
Rept. for Dec 63-Aug 64,
by Gerald P. D'Arcy, Harry E. Auld, and Gerald G. Leigh. Apr 65, 81p WL TR-65-11
Proj. 5710
Unclassified report

Descriptors: (*Nuclear explosions, Simulation), Nuclear weapons, Airburst, Detonation waves, Ground effect, Simulators, Explosive gases, Detonating card, Air Force research, Vulnerability, Nuclear explosion damage, Structures, Defense systems.

An analytical and experimental program was performed to determine the most promising techniques for simulating the air-blast-induced ground motions from a large-yield nuclear weapon. Two techniques were then selected for further development. One of the selected techniques employs a detonable gas mixture and the other a primacord matrix to generate a traveling shock wave which loads the ground. The nuclear air-blast overpressure environment is described and the simulation produced by either scheme is compared with this environment. The primacord technique was then selected because it was found to be the most practical and economical. Sufficient data are presented to enable the design of simulation experiments which use either technique. (Author)

AD-614 995 Div. 13
CFSTI Prices: HC$1.00 MF$0.50

Arctic Health Research Center, Anchorage, Alaska.
COLOR REMOVAL FROM SURFACE WATERS BY HYPOCHLORITE: FIELD TESTS ON WATER AT KOTZEBUE AIR FORCE SITE,
by Walter R. Wilson and John L. S. Hickey.
Jan 65, 13p
Proj. 8246, Task 824601
AAL TDR-64-18

Unclassified report

Descriptors: (*Water supplies, Purification), (*Hypochlorites, Water supplies), Discoloration, Chlorine, Water tanks, Colors, Chemical analysis.

A practical method was sought for removing the unacceptably high color and chlorine demand from the surface water source used at Kotzebue Air Force Site. Earlier laboratory tests of this water had indicated that treatment with 10 to 40 ppm chlorine would produce satisfactory water, with 95% color removal. Field tests were conducted at the site in 1962 and 1963. Treatment with 32 ppm chlorine reduced color from 70 cobalt units to 10-15 units in 24 days, with a final chlorine residual of 2 ppm. Treatment with 21 ppm chlorine reduced color to 20 units in 82 days, at which time the chlorine residual was zero and recoloration began. Although results of the field tests did not entirely agree with laboratory findings, the 32 ppm chlorine dose was found to be a satisfactory, simple and practical method of treatment. Reduction of chlorine residual to an acceptable level occurred within 24 days following treatment. (Author)

AD-614 996 Div. 13
CFSTI Prices: HC$1.00 MF$0.50

Arctic Health Research Center, Anchorage, Alaska.
OBSERVATIONS ON A SEWAGE OXIDATION POND IN SOUTHCENTRAL ALASKA,
by D. K. Hilliard. Jan 65, 24p
Proj. 8246, Task 824601
AAL TDR-64-17

Unclassified report

Descriptors: (*Sewage, Oxidation), (*Algae, Fouling), (*Plankton, Fouling), Sanitary engineering, Photosynthesis, Ammonium compounds, Phosphorus compounds, Phosphates, Chemical analysis, Temperature, Freezing, Ice, Odors, Oxygen, pH, Alaska.

The water chemistry of this facility indicated that during the period of maximum photosynthetic activity (May through August), ammonium compounds and phosphate phosphorus appeared to be readily utilized by the algae, but during the colder months these compounds built up significantly. Similarly, the biological oxygen demand (BOD) was generally low during the warmer months (30 mg/1 or less) but increased appreciably with the advent of ice cover. The pH and dissolved oxygen content both indicate a photosynthetically healthy regime during the warmer months, but the latter parameter became depressed with occurrence of ice. Pond odor was not detectable until after ice cover had formed. Plankton analyses indicated 18 taxa of photosynthetically active algae, belonging principally to Chlorococcales and Volvocales. Of the last named order, 11 species are new for North America and presumably are new records as sewage-tolerant organisms. The Alaskan pond was compared with an experimental pond receiving comparable BOD loading at Fayette, Missouri, and the results are discussed. (Author)

AD-615 015 Div. 13, 25, 28, 32
CFSTI Prices: HC$3.00 MF$0.75

Bolt, Beranek, and Newman, Inc., Los Angeles, Calif.
LAND USE PLANNING RELATING TO AIRCRAFT NOISE.
Technical rept.
Oct 64, 58p

Unclassified report

Jointly supported by the USAF and the FAA.

Descriptors: (*Airplane engine noise, Urban planning), (*Urban planning, Airplane engine noise), Terminal flight facilities, Urban areas, Site selection, Instruction manuals, Jet engine noise, Hearing, Thresholds (Physiology), Determination, Civil aviation, Armed forces operations.

This manual describes a procedure for predicting average community responses to engine noise generated by aircraft operations. Through the use of this procedure it becomes possible to apply the same yardstick to military and civil aircraft noise problems. The procedure therefore can serve as a uniform guide in plans for land utilization in the vicinity of military, civil and combined airfield facilities world-wide.

AD-615 017 Div. 13
CFSTI Prices: HC$5.00 MF$1.00

Massachusetts Inst. of Tech., Cambridge. School of Engineering.
NON-LINEAR RESPONSE OF REINFORCED CONCRETE SPHERICAL DOMES TO AIR BLAST LOADING,
by Richard P. Mayor and Robert J. Hansen. Nov 63, 173p Rept. no. R63-53
Contract DA49 146XZ129, Proj. 9155
DASA 1442

Unclassified report

Descriptors: (*Reinforced concrete, Structural shells), (*Hemispherical shells, Blast), (*Loading (Mechanics), Blast), (*Blast, Hemispherical shells), Programming (Computers), Air, Tests, Model tests, Mathematical models, Strain (Mechanics), Stresses, Mathematical analysis, Numerical methods and procedures, Transformation (Mathematics).

A method is developed to predict the response of a concrete dome to an air blast load. The problem is physically non-linear because of the stress-strain laws considered for steel and concrete and also geometrically non-linear because finite displacements are taken into account. The stress-strain relations, and the equations of motion are derived directly in finite difference form for computer use by postulating a lumped mass model to simulate shell behavior. A simplified representation in terms of the model of the behavior of reinforced concrete is also presented. A predictor-corrector method is used to integrate the equations and attention is given to computer efficiency and storage limitations. Finally, some results for the axis-symmetric case are compared to other studies that have been made. (Author)

AD-615 087 Div. 13
CFSTI Prices: HC$1.00 MF$0.50

Arctic Health Research Center, Anchorage, Alaska.
DESIGN CRITERIA FOR A SEWAGE OXIDATION POND IN ARCTIC ALASKA,
by Walter R. Wilson. Feb 65, 18p
Proj. 8246, Task 824601
AAL TDR-64-19

Unclassified report

Descriptors: (*Sewage, Oxidation), (*Waste (Sanitary engineering), Tanks (Containers)), (*Tanks (Containers), Design), Sanitary engineering, Arctic regions, Spores, Processing, Air Force, Alaska.

Through an Interservice Agreement with the Air Force, the Environmental Sanitation Section (ESS) of the Arctic Health Research Center (AHRC) has prepared design criteria for the construction of an experimental anaerobic pond followed in series by an aerobic pond for treating sewage from the Base. Because of the annual 6-month period of ice cover in this locale, the anaerobic pond has been designed large enough to store the entire winter sewage flow of 12 million gallons. During the summer months the stored sewage will be fed into the aerobic pond for a 10-day retention period with subsequent discharge. It is hypothesized that the almost continual summer sunlight will greatly increase algal action and satisfaction of Biological Oxygen Demand (BOD), resulting in adequate treatment with a shorter detention time and higher BOD loadings than are generally used. ESS will monitor the operation of the pond upon its completion to determine operating efficiencies, optimum loading and bacterial and chemical phenomena during the different seasons. Results of the study should permit establishment of more exact design criteria for future arctic sewage oxidation ponds. (Author)

AD-615 118 Div. 13, 30
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
THE SYSTEMS APPROACH TO FIRE PROTECTION PROBLEMS: AN OVERVIEW,
by Hilton F. Jarrett. 15 Apr 65, 32p
Rept. no. SP-2031/000/01

Unclassified report

Descriptors: (*Fire safety, Systems engineering), (*Systems engineering, Fire safety), Performance (Engineering), Fire alarm systems, Fire extinguishers, Fire pumps, Fire fighting vehicles, Water supplies, Personnel, Training, Performance (Human).

This paper presents an overview of the systems approach, which, as used here, entails the employment of 'scientific method' in considering those aspects of a system that influence its overall performance. Tools and techniques (e.g., models, simulation, mathematical statistics and probability, human factors, and cost-effectiveness) for assisting those concerned with making decisions about systems are discussed briefly, and the suggestion is made that this approach be given consideration as an aid in resolving some of the problems found in fire protection engineering work. (Author)

AD-615 121 Div. 13
CFSTI Prices:HC$3.00 MF$0.75

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
APPLICATION OF THE MATRIX DISPLACEMENT METHOD TO THE LINEAR ELASTIC ANALYSIS OF SHELLS OF REVOLUTION,
by John H. Percy, Theodore H. H. Pian, Dhirendra R. Navaratna, and Stanley Klein.
Jan 65, 84p ASRL-TR-121-7
Contract AF04 694 427

Unclassified report

Descriptors: (*Structures, Mathematical analysis), (*Structural shells, Bodies of revolution), Elasticity, Stresses, Statics, Matrix algebra, Deformation, Numerical analysis, Loading (Mechanics).

The report describes the application of the matrix displacement method to the linear elastic analysis of shells of revolution. The shell is idealized as a series of conical frusta, joined at nodal circles. The use of this idealization to handle asymmetric deformations is demonstrated. It is shown how approximations to the mass and stiffness matrices may be consistently derived; these may then be used to solve both static and dynamic problems. The effect on the results of static analyses of improving the approximation to the stiffness matrix is demonstrated and discussed. Results of static analyses of several shell configurations are presented and these are compared with solutions by other methods. (Author)

14. Materials (Non-Metallic)

AD-614 571 Div. 14, 1, 26
CFSTI Prices: HC$1.00 MF$0.50

Schjeldahl (G. T.) Co., Northfield, Minn.
LIGHTWEIGHT REINFORCED BALLOON MATERIAL INVESTIGATION.
Final rept. for 1 Oct 64-31 Mar 65,
by John A. MacFadden. 20 Apr 65, 19p
Contract Nonr409600, Proj. NR211 076
Unclassified report

See also AD-612 598.

Descriptors: (*Balloons, Polyester plastics), (*Polyester plastics, Balloons), Plastic seals, Sealing compounds, Tapes, Aging (Materials), Fibers, Payload, Reinforcing materials, Laminated plastics, Materials.

The leakage of balloons constructed of 0.25-mil Mylar laminated to scrim was determined to be caused by point blocking. Antiblocking agents and modified adhesives were found ineffective. Laminating Mylar to both sides of the scrim prevents blocking, but results in a balloon heavier than desired. Light gage Mylar as received was found to be an acceptable material for zero-pressure balloons. Manufacturing techniques involving minimum handling were found feasible but did not eliminate leakage. A folded-tape sealer was developed and found to substantially increase sealing speed and improve seal quality. (Author)

AD-614 593 Div. 14, 4
CFSTI Prices: HC$1.00 MF$0.50

American Oil Co., Whiting, Ind.
DEVELOPMENT OF NONFLAMMABLE HYDRAULIC FLUID.
Bimonthly progress rept. no. 6, 1 Feb-1 Apr 65,
by K. R. Bunting, A. M. Dobry, E. A. Swakon, P. C. Vienna, and L. W. Mixon. 1 Apr 65, 8p
Contract NObs90267, Proj. SR001 03 01, Task 606
Unclassified report

See also AD-611 396.

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry)), Flammability, Polyethylene plastics, Organic phosphorus compounds, Phosphorus compounds, Molybdates, Hydroxides, Sea water, Compatibility, Toxicity, Lubricants, Pumps, Storage, Viscosity.

The objective of the study is the development of a water-base hydraulic fluid which (1) yields a fire-resistant non-aqueous residue, (2) is compatible with materials of construction and sea-water contamination, (3) satisfactorily lubricates shipboard pumps, (4) presents no unusual storage or handling problems, and (5) exhibits no toxicological hazards under conditions of use. A fluid was developed which appears to have the desired properties. It contains about 20% of a thickener prepared by chlorophosphonating polyethylene (12,000 m.w.) followed by hydrolysis and neutralization with potassium hydroxide. Potassium bis-hydroxymethyl phosphonate (25%) and potassium molybdate (1%) are added as pour depressor and corrosive inhibitor respectively. This fluid performs satisfactorily in a Vickers Vane pump run at 150F and 1000 psi and shows satisfactory viscosity and pour-point properties. Other tests are being carried out. (Author)

AD-614 665 Div. 14, 13
CFSTI Prices: HC$3.00 MF$0.75

Pittsburgh Univ., Pa.
REDUCING THE EFFECT OF FREEZING TEMPERATURES ON THE COMPRESSIVE STRENGTH OF CONCRETE WITH CALCIUM CHLORIDE AND AIR ENTRAINMENT.
Master's thesis,
by Carl Sherwyn Fairbank, Jr. 1965, 58p
Unclassified report

Descriptors: (*Concrete, Compressive properties), (*Freezing, Concrete), Low-temperature research, Air, Cements, Aging (Materials), Additives, Calcium compounds, Chlorides.

Untreated and unprotected fresh concrete should not be exposed to freezing temperatures. If untreated fresh concrete freezes, it will not gain strength while frozen. It may gain strength upon resumption of normal curing. The ultimate compressive stress of normal concrete is increased with the use of a calcium chloride admixture. Air entrainment offers no advantage as an antifreeze agent. Air entrainment lowers the ultimate compressive stress of concrete. The percentage of air which is entrained in concrete is partially controlled by the mixing time. Calcium chloride is an excellent accelerating admixture when used in concrete which is cured under normal conditions. Use of the admixture increased the ultimate compressive stress of specimens cured in the moist room. The use of calcium chloride as an accelerating admixture permits fresh concrete which is exposed to freezing temperatures to gain some compressive strength. The strength attained is lower than it would be if the fresh concrete were protected from freezing and cured normally. Type III portland cement with a calcium chloride admixture produced the highest percentage of normal compressive stress when the fresh concrete was exposed to freezing temperatures. (Author)

AD-614 678 Div. 14, 13
CFSTI Prices: HC$5.00 MF$1.00

Colorado Univ., Boulder.
STRENGTH AND BEHAVIOR OF SPIRALLY PRESTRESSED CONCRETE CYLINDERS UNDER ECCENTRIC LOADING.
Masters' Thesis,
by Arthur Theodore Gardner. 1965, 164p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Cylindrical bodies, Reinforced concrete), (*Reinforced concrete, Loading (Mechanics)), (*Loading (Mechanics), Reinforced concrete), Stresses, Reinforcing materials, Concrete, Steel, Compressive properties, Failure (Mechanics), Strain (Mechanics), Mathematical analysis.

An investigation was made of three inch diameter by twelve inch long concrete cylinders prestressed with high strength steel spirals. The results of the experimental work are given and the behavior of the cylinders under the application of axial and eccentric loads are described. Sixty-eight spirally wrapped cylinders were tested during this investigation. The variables considered were (1) percentage of spiral reinforcement (2) initial prestress in the spiral reinforcement and (3) eccentricity of loading. It is shown that (1) the principal effect of the initial prestress in the spiral reinforcement was to alter the initial stiffness of the

cylinder (2) the initial prestress in the spiral reinforcement had no corresponding significant effect upon the ultimate load capacity and (3) the primary result of varying the percentage of spiral reinforcement was to alter the lateral restraint of the concrete so that it could develop its strength to different degrees in a gradual type of compression or tension failure depending upon the eccentricity of the loading. The ultimate load formulas for compression and tension type of failures in the current ACI Building Code (ACI 318-63) are modified to include the contribution by the spiral reinforcement to the ultimate load. (Author)

AD-614 731 Div. 14, 4

Research Triangle Inst., Durham, N. C.
PREPARATION AND CHARACTERIZATION OF SOME CELLULOSE GRAFT COPOLYMERS. PART III. THE ROLE OF CONCURRENT DEGRADATION DURING RADIATION GRAFTING,
by J. D. Wellons and V. Stannett. 10 Jun 64, 11p
AROD 3630:8

Unclassified report

Pub. in Journal of Polymer Science: Part A v3 p847-57 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cellulose acetates, Radiation chemistry), (*Copolymerization, Radiation chemistry), (*Radiation chemistry, Copolymerization), Decomposition, Organic solvents, Pyridines, Aromatic compounds, Films, Styrene plastics, Polyethylene plastics.

The radiation degradation of cellulose acetate was studied both in the dry state and in solution. The rate of degradation was greater in the solid state and was unaffected by oxygen. Conjugated solvents such as pyridine, toluene, and alpha-methylstyrene were shown to exert considerable protection against the radiation degradation of cellulose acetate when in solution or as swollen films. Alpha-methylstyrene was used as a model for styrene to study the amount of degradation accompanying the grafting process. Matching experiments were carried out by using both the mutual and preirradiation methods of grafting. Considerably greater chain cleavage was found to accompany the grafting in the preirradiation case. With both methods the number of chain cleavages was measured when alpha-methylstyrene was present in the 'grafting' solution and the number of grafted side chains when styrene was used. It was shown that at least twice as many grafted chains as cleavages occur with the mutual technique, but in the case of preirradiation the number of cleavages is comparable to the number of grafted chains. In general, it can be said that in every case at least 50% of the graft copolymers are side-chain grafts; this figure is probably considerably higher in the case of the mutual radiation preparations. (Author)

AD-614 739 Div. 14, 4

Florida State Univ., Tallahassee.
THE EFFECT OF MOLECULAR WEIGHT ON THE MELTING TEMPERATURE AND FUSION OF POLYETHYLENE,
by J. G. Fatou and L. Mandelkern. 22 Jun 64, 13p
Grant DA ARO D31 124 448
AROD 4222:2

Unclassified report

Pub. in Journal of Physical Chemistry v69 n2 p417-28 Feb 1965 (Copies not available to DDC or Clearinghouse customers).
Research supported partly by Atomic Energy Commission, Washington, D. C.

Descriptors: (*Molecular weight, Polyethylene plastics), (*Polyethylene plastics, Melting), (*Melting, Polyethylene plastics), (*Phase studies, Polyethylene plastics), Density, X-ray diffraction analysis, Temperature, Transition temperature, Molecular properties, Crystallization.

The fusion process, melting temperature, density, and wide-angle X-ray diffraction of carefully crystallized molecular weight fractions of linear polyethylene encompassing a molecular weight range from 3 x 10 to the 3rd power to 1.5 x 10 to the 6th power have been investigated. For molecular weights less than 50,000 the densities at room temperature are very close to the value of the unit cell, and the wide-angle X-ray diffraction patterns are typified by very sharp reflections and the absence of the usual halo. Above this molecular weight a monotonic decrease of the density with molecular weight is observed. The reflections in the X-ray pattern broaden and the halo appears. These results can be given a consistent explanation in terms of the relation of the crystallite size to the extended chain length and the coexistence of amorphous regions in the higher molecular weight range. The melting temperatures also depend on molecular weight and reach an asymptotic value of 138.5°. The difference between the observed melting temperature and that calculated for equilibrium also depends on molecular weight and can be explained, over the complete range, by assuming crystallite sizes in the chain direction comparable to those of the nuclei from which they are formed.

AD-614 761 Div. 14
CFSTI Prices: HC$1.00 - MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CERTAIN PROPERTIES OF HIGHER PURITY ZIRCONIUM DIOXIDE,
by G. P. Kalliga and L. A. Lyutsareva. 9 Apr 65, 9p FTD-TT-64-1068
TT 65-62081

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Khimiya i Khimicheskaya Tekhnologiya (USSR) v7 n1 p106-10 1964.
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Descriptors: (*Ceramic materials, Zirconium compounds), (*Zirconium compounds, Dioxides), Physical properties, Stabilization, Additives, Calcium compounds, Oxides, Magnesium compounds, Sintering, Titanium compounds, Aluminum compounds, Heat-resistant materials, Ceramic materials, USSR.

An increase in purity of initial zirconium dioxide to a 99.5% content of basic oxide, improves the phys-mechan properties of the material at high temperatures, which considerably exceed analogous characteristics for objects on technical ZrO2 base. The optimum amount of stabilizing oxide for ZrO2 of higher purity is 10 mol. % of CaO or MgO, which under industrial calcining temperatures (1700-1750C) assures total sintering of the material, sufficient degree of its stabilization and highest phys-mechanical properties. Stabilization of ZrO2 with magnesium oxide assures better calcining (packing) of the material mainly at low sintering temperatures (to 1700C) and obtainment of calcined objects with much higher mechanical characteristics in comparison with ZrO2, stabilized with calcium oxide. TiO2 and A12O3 admixtures even though they do improve the sintering of ZrO2 of higher purity during its stabilization with calcium oxide, but simultaneously they reduce the heat resistant properties of the material, which is especially evident in case of an A12O3 admixture. (Author)

AD-614 784 Div. 14, 1
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
INITIAL FIELD TESTING OF AIRFIELD MARKING PAINTS.
Rept. for Sep 63-Feb 65,
by R. W. Drisko. May 65, 16p
Technical rept. no. R-296, suppl.
Proj. Y R007 08 03 303

Unclassified report

Descriptors: (*Runways, Paints), (*Paints, Runways), Airports, Paint applicators, Asphalt, Environmental tests, Life expectancy, Degradation, Plastic paints, Rubber coatings, Optical coatings.

Technical Report R-296 described the application of test stripes to an operational asphalt runway and reported their condition at the time of three inspections made within 64 days. This supplement presents further data on their condition at four additional periods of time up to a total of 568 days. A vinyl toluene-butadiene paint showed the least deterioration of the five paints tested and was in generally good condition after 568 days. A chlorinated rubber-alkyd was in fairly good condition. An oleoresinous paint began to deteriorate slowly after about 6 months. Alkyd and epoxy stripes had early edge cracking and loss of paint and slurry seal. Significantly, analysis showed that these two paints had half the percent elongation of the other three paints. (Author)

AD-614 785 Div. 14, 7, 25
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
COUPLING COEFFICIENTS AND THE THREE DIMENSIONAL, PIEZOELECTRIC CERAMIC CYLINDER,
by George K. Lucey, Jr. 15 Feb 65, 19p
Rept. no. TR-1274
Projs. DA1N523 801A300, 96300

Unclassified report

Descriptors: (*Ceramic materials, Piezoelectric effect), (*Piezoelectric crystals, Ceramic materials), Cylindrical bodies, Differential equations, Resonators, Resonance, Vibration, Transformaners, Microminiaturization (Electronics), Disks, Rods, Polarization, Ferroelectric materials.

Antiresonant frequency equations for piezoelectric, ceramic cylinders of any dimensions are defined and combined with previously derived resonant frequency equations to show the types of errors that could be encountered if frequency data from thick disks and short rods were used to calculate the coupling coefficients k sub p and k sub 33 using equations that are reported in the literature for samples having dimension ratios less than 0.1. It is shown that although Poisson's ratio alters the effect of the characteristic frequencies of such samples on coupling coefficient, the coupling coefficients will not necessarily be miscalculated. In addition, when calculated coefficients are erroneous, the values may be either high or low, depending upon the cylinder properties. This information supplements the IRE (IEEE) Standards which mentions high values only when such calculations are made. (Author)

AD-614 957 Div. 14
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF TEMPERATURE ON FRICTION AND WEAR OF FILLED FLUORINATED PLASTIC MATERIALS,
by V. D. Parkhomenko and S. N. Gants. 19 Apr 65, 7p FTD-TT-64-1176
TT 65-62146

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Mashinostroenie (USSR) n9 p130-3 1963.

Descriptors: (*Halocarbon plastics, Mechanical properties), Fluorine compounds, Additives, Molybdenum compounds, Sulfides, Boron compounds, Nitrides, Barium compounds, Sulfates, Talic, Carbon, Graphite, Wear resistance, Friction, Temperature, Pressure, USSR.

An examination was made of the effect of temperature and the nature of the filler (molybdenum disulfide, boron nitride, barium sulfate, ground coke, talic, soot, or colloidal graphite) on the coefficient of friction and wear of 'Fluoroplast' (poly(chlorotrifluoro ethylene)) while undergoing a witer-lubricated friction process. In general: (1) wear decreases with increasing filler content (up to a limit); (2) wear increases with increasing water temperature; (3) the coefficient of friction (mu) increases as temperature increases; (4) mu decreases with increasing specific pressure; and (5) mu decreases with increasing speed of sliding. Under the test conditions, MoS2, BN, BaSO4, and coke proved improve the wear resistance to a greater extent than the other fillers.

AD-614 960 Div. 14, 26
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
LUBRICANT FOR PROCESSES OF UPSETTING AND DRAWING OF METALS,
by L. L. Baibakova and Z. G. Smolkotina.
14 Apr 65, 5p FTD-TT-64-1197
TT 65-62149

Unclassified report

Unedited rough draft trans. of Russian patent 161856, appl. 821339/23-4, Feb 23 1963.

Descriptors: (*Lubricants, Material forming), Metals, Forging, Drawing (Machine processing), Calcium compounds, Fatty acids, Powders, Patents, USSR.

The object of the invention is the application of calcium soaps of synthetic acids of the fraction C sub 6--C sub 6 as a lubricant for the processes of upsetting and drawing of metals. (Author)

AD-614 991 Div. 14
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A SURVEY OF DEVELOPMENTS IN WHISKER COMPOSITES IN THE UNITED STATES,
by George A. Hoffman. Apr 65, 14p
Rept. no. P-3129

Unclassified report

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Descriptors: (*Fiber metallurgy, Single crystals), (*Composite materials, Filaments), (*Filaments, Single crystals), Ceramic materials, Fibers, Glass fibers, Reinforcing materials, Aluminum compounds, Oxides, Silicon compounds, Carbides, Boron compounds,

Pyrolitic graphite, Crystal growth, Surface-active substances, Bonding, Binders, Mechanical properties, Loading (Mechanics), Structural properties.

The present effort in the United States toward developing composite materials utilizing single crystal filaments (whiskers) as reinforcement is reviewed. The survey describes first the developments in growing whiskers of various substances such as high-melting-point ceramics. Next, those projects are listed which aim at incorporating whiskers into composite test samples with a usable material as an ultimate goal. Finally, the more general designs and analyses of filamentary composites are reviewed, particularly those dealing with the problems in the micromechanics, design utilization and possible applications. Some directions in future efforts in whisker composites, as presently planned, are predicted. (Author)

AD-615 028 Div. 14, 17
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ALUMINUM CERMET ALLOY,
by R. A. Krivenko, I. N. Fridlyander, N. S. Klyagina, M. L. Khrenkin and S. I. Spektorova. 7 Apr 65, 4p
FTD-TT-65-300
TT 65-62160
Unclassified report

Unedited rough draft trans. of Russian patent 154670, appl. 786820/22-2, Jul 13 1962.

Descriptors: (*Cermets, Aluminum alloys), (*Aluminum alloys, Cermets), Silicon alloys, Silicon compounds, Carbides, Additives, Plasticity, USSR.

The object of the invention is an aluminum cermet alloy containing 10-15% silicon to which 20-30% silicon carbide is added to its composition to increase the alloys plasticity.

AD-615 098 Div. 14, 26
CFSTI Prices: HC$4.00 MF$0.75

United Aircraft Corp., East Hartford, Conn. Research Labs.
EXPLORATORY INVESTIGATION OF GLASS-METAL COMPOSITE FIBERS.
Final rept. for 13 Apr 64-12 Apr 65,
by J. E. Cox, R. D. Veltri, and C. E. Shulze. 7 May 65, 108p Rept. no. D910242-6
Contract NOw64 0389f
Unclassified report

Descriptors: (*Composite materials, Fibers), (*Metals, Fiber metallurgy), (*Glass, Composite materials), Filaments, Beryllium, Copper, Chromium, Aluminum, Encapsulation, Tin, Iron, Coatings, Oxides, Drawing (Machine processing), Metal coatings, Melting.

An investigation has been conducted to develop a process for the production of continuous metal filaments by a technique which involves the casting of molten metal as a core material in a glass capillary as the capillary is continuously formed from glass tubing. Beryllium and copper have been given major consideration as the core metals; chromium, aluminum, iron and tin have been given minor attention. Although beryllium-in-glass composite fibers have been produced by a hand-drawing technique, the development of a continuous process to date has been unsuccessful due to the reaction between beryllium and glass at high temperature. A few short lengths of beryllium-in-glass composite fiber have been obtained by use of protection tubes in the continuous process studies. However, the destructive reaction between beryllium and glass could not be sufficiently reduced forcontinuous operation. Based on all observations, it appears that the pressure technique is the most attractive approach for further investigations. Copper-glass composite investigations have been chiefly concerned with specimen preparation and process variables such as size, type and purity of raw materials, operating temperature, furnace design, and forming rate. Copper core diameters in the submicron range have been obtained but lack of continuity of the core has been a serious fault. Larger core diameters, in the range of 20 microns, have been obtained in appreciable lengths up to 34 feet long. Studies of other composite fiber systems, including chromium, iron, aluminum and tin were very limited but some success in these areas was indicated. (Author)

AD-615 158 Div. 14
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
DETERMINATION OF THE REFLECTING PROPERTIES OF PRESSED MgO POWDER,
by Donald Mary. 5 Mar 65, 16p
Rept. no. TM-65-12
Projs. DA1P222901A207, 36100
Unclassified report

Descriptors: (*Ceramic materials, Reflection), (*Magnesium compounds, Oxides), Powders, Diffusion, Standards, Measurement.

Blocks of pressed MgO powder have recently become available for use as diffuse reflectance standards. The calibration of one such sample in the visible portion of the spectrum is described. Specifically, the total hemispherical reflectivity was determined together with its dependence on the direction of view. (Author)

15. Mathematics

AD-614 568 Div. 15, 30
CFSTI Prices: HC$3.00 MF$0.75

Naval Weapons Lab., Dahlgren, Va.
A METHOD FOR COMPUTING THE INCOMPLETE BETA FUNCTION RATIO,
by A. R. DiDonato and M. P. Jarnagin, Jr. 28 Feb 65, 58p Rept. no. NWL-1949
Unclassified report

Descriptors: (*Integrals, Numerical methods and procedures), (*Statistical distributions, Integrals), Distribution theory, Digital computers, Programming languages, Programming (Computers).

An efficient method is given for computing the incomplete beta function ratio, I sub x(a,b), on a high speed digital computer. The arguments a,b, are limited to positive integer or positive integral multiples of one-half values over the ranges 1/2 or=a or=10 to the 8th power, 1/2 or=b or=60. I sub x can be computed to at least 8 decimal digits. The program has been coded in STRAP for the IBM 7030 (STRETCH). The average computing time per case is 2.6 milliseconds; on an IBM 7090 it would be about 8 milliseconds per case. (Author)

AD-614 576 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Operations Research Center, Univ. of Calif., Berkeley.
UPDATING THE PRODUCT FORM OF THE INVERSE FOR THE REVISED SIMPLEX METHOD,
by G. B. Dantzig, Roy Harvey, and Robert McKnight.
Dec 64, 13p ORC-64-33
Contract Nonr22283
Unclassified report

The research of Roy Harvey and Robert McKnight was directly supported by Standard Oil Co., of California.

Descriptors: (*Linear programming, Matrix algebra), (*Matrix algebra, Linear programming), Iterative methods, Combinatorial analysis, Transformations (Mathematics), Operations research.

A method by which the number of transformation matrices in the product form of the inverse for the revised simplex method of solution of linear programs need never exceed m, the number of rows. (Author)

AD-614 577 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Operations Research Center, Univ. of Calif., Berkeley.
GENERALIZED UPPER BOUNDING TECHNIQUES FOR LINEAR PROGRAMMING, II,
by George B. Dantzig and Richard M. Van Slyke.
Feb 65, 26p ORC-64-18
Contract Nonr22283
Unclassified report

Descriptors: (*Linear programming, Optimization), Matrix algebra, Iterative methods, Operations research, Theorems, Combinatorial analysis.

A variant of the simplex method is given for solving linear programs with M + L equations, L of which have the property that each variable has at most one nonzero coefficient. Special cases include transportation problems, programs with upper bounded variables, assignment and weighted distribution problems. The algorithm described uses a working basis of M rows for pivoting, pricing, and inversion which for large L can result in a substantial reduction of computation. This working basis is only M x M and is a further reduction of the size found in an earlier version, see AD-610 950. Unfortunately, to achieve this reduction, row as well as column transformations must now be made. (Author)

AD-614 578 Div. 15
CFSTI Prices: HC$3.00 MF$0.75

Operations Research Center, Univ. of Calif., Berkeley.
PROGRAMMING IN NETWORKS AND GRAPHS,
by Ellis L. Johnson. Jan 65, 63p ORC-65-1
Contract Nonr22283; Grant NSF GP2633, Proj. NR047 033
Unclassified report

Descriptors: (*Linear programming, Optimization), Matrix algebra, Graphics, Topology, Iterative methods, Operations research, Combinatorial analysis.

AD-614 608 Div. 15, 26
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
EXPONENTIAL LIFE TEST PROCEDURES WHEN THE DISTRIBUTION HAS MONOTONE FAILURE RATE,
by Richard E. Barlow and Frank Proschan. Feb 65, 39p
Mathematical note no. MN-396, D1-82-0415
Unclassified report

Also available from the author.
Prepared in cooperation with Operations Research Center, Univ. of Calif., Berkeley; Contract Nonr365618, Rept. no. ORC-64-29
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Statistical distributions, Reliability), Life expectancy, Failure (Mechanics), Operations research, Stochastic processes, Statistical tests, Quality control, Replacement theory.

A number of estimates and tests for mean life and other parameters derived under the exponential distribution assumption are studied under the alternative condition that the distribution has increasing (decreasing) failure rate. The estimates considered are, for the most part, based on censored and truncated samples. It is shown that these estimates generally favor the producer (consumer) in the IFR (DFR) case. Properties of order statistics and their spacings from distributions with increasing (decreasing) failure rate are presented. (Author)

AD-614 635 Div. 15, 2, 25
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NUMERICAL RESULTS FOR CHANDRASEKHAR'S X AND Y FUNCTIONS OF RADIATIVE TRANSFER,
by R. Bellman, H. Kagiwada, R. Kalaba, and Sueo Ueno. Apr 65, 34p Rept. no. RM-4531-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Functions, Numerical analysis), (*Graphics, Functions), (*Transport properties, Functions), Reflection, Wave transmission, Neutron transport theory.

From many points of view the X and Y functions of Chandrasekhar may be considered to be the basic

functions of radiative transfer. In this memorandum the authors present graphs of these functions covering wide ranges of slab thicknesses and albedos for single scattering. The tables on which the graphs are based were obtained by numerically integrating the integro-differential equations satisfied by the X and Y functions. One of the great advantages of such graphs and tables is that one can test the accuracy of simple approximate expressions. (Author)

AD-614 636 Div. 15, 2, 25
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NUMERICAL RESULTS FOR THE AUXILIARY EQUATION OF RADIATIVE TRANSFER,
by R. Bellman, H. Kagiwada, and R. Kalaba.
Apr 65, 26p Rept. no. RM-4572-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Integral equations, Numerical analysis), (*Functions, Graphics), (*Transport properties, Integral equations), Tables, Optical properties, Neutron transport theory.

A basic problem in astrophysics, meteorology and neutron transport theory is the determination of the internal intensity produced when uniform parallel rays illuminate a slab of finite thickness which both absorbs and scatters radiation isotropically. One approach to this problem is through the intermediate step of determining the source function which represents the rate of production of scattered radiation per unit volume per unit solid angle as a function of the depth below the top surface. Ordinarily this function is characterized as the solution of a singular integral equation, which presents difficulties from the numerical viewpoint. In earlier memoranda the authors derived other differential integral equations for the source function viewed as a function of the thickness of the slab. In this memorandum they present the results of extensive calculations of source functions in both graphical and tabular form. (Author)

AD-614 732 Div. 15

California Univ., Berkeley.
A NOTE ON THE DISTRIBUTION OF SUMS OF INDEPENDENT RANDOM VARIABLES,
by L. Le Cam. 1 Aug 63, 4p
Grants DA AROD31 124G83, DA AROD31 124G548
AROD 362:61
Unclassified report

Pub. in Proceedings of the National Academy of Sciences v50 n4 p601-3 Oct 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Combinatorial analysis, Distribution theory), (*Distribution theory, Combinatorial analysis), (*Stochastic processes, Distribution theory), Measure theory, Probability.

AD-614 788 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
PEAKEDNESS OF DISTRIBUTIONS OF CONVEX COMBINATIONS,
by Frank Proschan. Nov 64, 15p Unclassified report
Math note MN-374, D1-82-0385
Also available from the author. Prepared in cooperation with California Univ., Berkeley, Contract Nonr365618, Rept. no. ORC-64-26(RR).

Descriptors: (*Statistical distributions, Real variables), (*Combinatorial analysis, Real variables), Sampling, Functions, Statistical functions, Stochastic processes.

This paper presents simple sufficient conditions under which the distribution of the sample average shows increasing peakedness with increasing sample size. The results are actually more general, permitting a comparison of the peakedness of distributions of various convex combinations of sample observations. (Author)

AD-614 792 Div. 15
CFSTI Prices: HC$4.00 MF$0.75

Colorado State Univ., Fort Collins.
A TWO-STEP SAMPLE SIZE PROBLEM.
Doctoral thesis,
by Robert Campbell Rounding. Mar 65, 104p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Sampling, Population (Mathematics)), Monte Carlo method, Sequential analysis, Analysis of variance.

A problem in sampling is given in which an estimator of the mean of a normal population is determined such that the estimator deviates from the true population parameter by less than a given percentage of the true parameter with at least a certain specified probability. The problem is solved in the multi-step framework in which a minimum total sample size is to be attained. Certain assumptions on the existence of an upper bound on the coefficient of variation or a known positive lower bound on the mean are made. One, two and three step procedures are developed, of which the two-step process emerges as the most practical. A feasibility study is conducted using a high speed computer to determine, for a given confidence level, the form of an expression for the sample size as a function of the sufficient statistics mean and standard deviation of the first sample.

AD-614 810 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
INDEFINITE INTEGRATION BY RESIDUES, II,
by R. P. Boas, Jr. and Lowell Schoenfeld. Feb 65, 19p Technical summary rept. no. MRC-TSR-542
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Integration, Complex variables), (*Complex variables, Integration), Integrals, Functions.

If F(z) is holomorphic in the extended complex plane except for a finite number of singularities, and if F(z) is holomorphic on the open arc ((cos a + i sin a) ... (cos b + i sin b)) of the unit circle except for simple poles, and if F(z) is holomorphic at cos a + i sin a and at cos b + i sin b, and if a < b < a + 2 pi and u = (b-a)/2, then the Cauchy principal value integral with respect to v of F(exp iv) from a to b is shown to equal i (R + s). R = the sum of the residues of (F(z)/z) log (exp iu (z-exp ia)/(z-exp ib)) for z in the extended plane but not on the closed arc from exp(ia) to exp(ib). S = the sum of the residues of (F(z)/z) log (exp iu (z-exp ia)/ (exp ib-z)) for z on (exp ia ... exp ib).

AD-614 811 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
UPON A GENERAL SYSTEM OF ORTHOGONAL POLYNOMIALS,
by P. Wynn. Mar 65, 25p Technical summary rept. no. MRC-TSR-548
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Polynomials, Power series), (*Power series, Continued fractions), (*Continued fractions, Transformations (Mathematics)), Transcendental functions, Sequences.

A general system of orthogonal polynomials, whose coefficients are functions of five parameters, is derived. As a special case of the parameter set this system of polynomials reduces to the classical (Jacobi, Laguerre, etc.) orthogonal polynomials. Further special choices of the parameters lead to entirely new systems of orthogonal polynomials. (Author)

AD-614 812 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
THE SPECTRA OF INFINITELY OSCILLATING POTENTIALS III,
by J. B. McLeod. Feb 65, 25p
Technical summary rept. no. MRC-TSR-549
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Differential equations, Potential theory), (*Potential theory, Boundary value problems), Oscillation, Perturbation theory, Sequences.

The pathological behavior of the spectrum of the second derivative of y with respect to x = - (L - q (x))y, for 0 < or = x < infinity, is studied when q (x) is a step-function alternately positive and negative and of increasing modulus. (Author)

AD-614 813 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
STRUCTURAL PROBABILITY AND A GENERALIZATION,
by D. A. S. Fraser. Mar 65, 19p
Technical summary rept. no. MRC-TSR-556
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Probability, Transformations (Mathematics)), (*Distribution theory, Probability), (*Transformations (Mathematics), Mathematical models), Statistical distributions, Sampling, Groups (Mathematics), Stochastic processes.

Structural probability, a reformulation of fiducial probability for transformation models, is discussed in terms of an error variable. A consistency condition is established concerning conditional distributions on the parameter space; this supplements the consistency under Bayesian manipulations found in Fraser (1961). An extension of structural probability for real-parameter models is developed; it provides an alternative to the local analysis in Fraser (1964b). (Author)

AD-614 834 Div. 15
CFSTI Prices: HC$3.00 MF$0.75

Stanford Univ., Calif. Dept. of Mathematics.
ASYMPTOTIC DISTRIBUTION OF GENERALIZED INTEGERS AND PRIME NUMBERS,
by Harold G. Diamond. 29 Apr 65, 62p
Technical rept. no. TR-1
Contract Nonr22579, Proj. NR043 317

Unclassified report

Descriptors: (*Prime numbers, Statistical distributions), (*Number theory, Prime numbers), Real numbers, Set theory, Topology, Statistical functions, Theorems.

The paper is divided into four chapters, of which the first two are concerned with a wide class of measures and general properties of these measures. The last two chapters deal with a few measures of prime number theoretic interest, and for these measures some special results are proved. In the first chapter 'C' and 'R' classes of measures are introduced. Convolution and certain other operations are defined and their elementary properties explored. A topology is induced in 'C' by total variation semi norms, and 'C' is shown to be a complete topological group under addition. The second chapter begins with some general results about convergence and continuity of power series in measures. C sub 1 denotes the elements of 'C' with point mass at 1, and all measures in C sub 1 is shown to be invertible in a convolution sense. The main result of the chapter is the representation of C sub 1 by 'C' under the exponential mapping. This mapping is shown to be a homeomorphism and an isomorphism of topological groups. As a corollary to this theorem the existence of nth roots of measures in C sub 1 is infered. G-primes and integers and their related measures are defined in the third chapter. Using the results of Chapter 2, the counting measure of g-integers and Lebesgue measure is shown to be given as exponentials. The prime number theorem for g-primes is the main result of the fourth chapter.

AD-614 854 Div. 15

Harvard Univ., Cambridge, Mass.
BOUNDEDNESS OF SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS AND LYAPUNOV FUNCTIONS,
by George R. Sell. 1964, 14p
Contract DA31 124AROD128
AROD 1617:46

Unclassified report

Pub. in Journal of Mathematical Analysis and Application v9 n3 p477-90 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Differential equations, Functional analysis), (*Functional analysis, Differential equations), Mapping (Transformations), Topology, Theorems.

AD-614 875 Div. 15, 25

RIAS, Inc., Baltimore, Md.
ON THE PARAMETRIZATION OF THE THREE-DIMENSIONAL ROTATION GROUP,
by John Stuelpnagel. 9 Mar 64, 9p
Contracts AF49 638 1242, NASw845
AFOSR 65-0616 Unclassified report

Pub. in SIAM Review v6 n4 p422-30 Oct 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Groups (Mathematics), Euler's angle), (*Euler's angle, Groups (Mathematics)), Rotation, Mathematical logic, Topology, Matrix algebra, Complex numbers, Invariance.

AD-614 897 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A RELATION BETWEEN EXPONENTIAL AND POLYNOMIAL METHODS FOR THE NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS,
by Paul Brock. Apr 65, 7p Rept. no. P-3126
Unclassified report

Descriptors: (*Numerical analysis, Differential equations), (*Differential equations, Numerical analysis), Polynomials, Algebra, Equations, Determinants, Integration.

Two classical methods for the numerical solution of ordinary differential equations are to approximate the function to be integrated either by a polynomial or as the sum of exponentials. The purpose of this note is to demonstrate that polynomial approximation method is a special, degenerate form of the exponential approximation method.

AD-614 915 Div. 15, 9
CFSTI Prices: HC$3.00 MF$0.75

Weizmann Inst. of Science, Rehovoth (Israel).
THE NUMERICAL INTEGRATION OF THE EQUATIONS OF MOTION OF A VISCOUS FLUID,
by J. Gillis and A. Brandt. 1 Oct 64, 58p
Scientific rept. no. SR-1
Grant AF EOAR63 73
AFOSR 65-0629
Unclassified report

Descriptors: (*Partial differential equations, Integration), (*Integration, Partial differential equations), (*Numerical analysis, Fluid mechanics), Viscosity, Incompressible flow, Two-dimensional flow, Israel.

The steady state Navier-Stokes equations are solved numerically for the inlet region of a straight channel for values of Reynolds number from 0 to 500. Various properties of the flow are discussed and the results compared with previous approximate solutions for large R. The case R = O is also solved analytically. (Author)

AD-614 917 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
DIFFERENCE SCHEMES FOR MANY DIMENSIONAL PROBLEMS,
by K. A. Bagrynovskii and S. K. Godunov. 1965, 7p
TT 65-62084
Unclassified report

Raznostnye Skhemy dlya Mnogomernykh Zadach, trans. of Akademiya Nauk SSSR. Doklady, v115 n3 p431-3 1957. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Difference equations, Numerical analysis), (*Partial differential equations, Numerical analysis), Stability, Matrix algebra, USSR.

A new method is described for constructing and investigating the stability-of-difference methods of solving Cauchy's problem for polydimensional systems of hyperbolic equations. If the construction of the difference scheme for the one-dimensional systems is known, then any scheme for an n-dimensional system can be constructed.

AD-614 931 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
NEW INTEGRAL REPRESENTATIONS FOR THE BESSEL FUNCTION J sub n(x),
by F. M. Ragab. Feb 65, 17p
Technical summary rept. no. MRC-TSR-552
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Bessel functions, Integrals), (*Integrals, Bessel functions), Series, Special functions (Mathematical), Integration, Theorems.

AD-614 932 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
ON MONOSPLINES OF LEAST DEVIATION AND BEST QUADRATURE FORMULAE,
by I. J. Schoenberg. Mar 65, 44p
Technical summary rept. no. MRC-TSR-554
Contract DA11 0220RD2059
Unclassified report

Descriptors: (*Least squares method, Numerical analysis), (*Numerical analysis, Least squares method), Functions, Integration, Polynomials, Algebra.

A number of classical quadrature formulae are shown to be best in the sense of A. Sard. Further best quadrature formulae are derived by means of spline interpolation. (Author)

AD-614 933 Div. 15, 25
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
ON THE ESSENTIAL SPECTRUM OF THE HYDROGEN ENERGY OPERATOR,
by P. A. Rejto. Jan 65, 48p
Technical summary rept. no. MRC-TSR-540
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Operators (Mathematical), Energy), (*Hydrogen, Operators (Mathematical)), (*Quantum mechanics, Functional analysis), Potential theory, Perturbation theory, Integration, Boundary value problems.

The essential spectrum of the hydrogen energy operator, i.e. of -delta-1/r is determined by showing that 1/r is delta-compact. It is noted that this situation is typical for a wider class of problems. (Author)

AD-614 934 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
NEW INTEGRAL REPRESENTATIONS OF THE MODIFIED BESSEL FUNCTION OF THE SECOND KIND,
by F. M. Ragab. Mar 65, 17p
Technical summary rept. no. MRC-TSR-544
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Bessel functions, Integrals), (*Integrals, Bessel functions), Series, Special functions (Mathematical), Integration, Theorems.

AD-614 935 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
AN ORDINATE-UNIQUENESS THEOREM FOR THE DIRICHLET PROBLEM FOR THE SYSTEM DELTA u = v2, DELTA v = u2,
by G. T. McAllister. Mar 65, 10p
Technical summary rept. no. MRC-TSR-546
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Partial differential equations, Boundary value problems), (*Boundary value problems, Theorems), Calculus of variations, Potential theory, Operators (Mathematics).

AD-614 937 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
A NOTE ON LIMIT THEOREMS FOR MARKOV BRANCHING PROCESSES,
by Howard Conner. Feb 65, 12p
Technical summary rept. no. MRC-TSR-545
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Statistical processes, Theorems), (*Theorems, Statistical processes), Stochastic processes, Real numbers, Functional analysis, Measure theory.

This paper shows how the fundamental limit theorems for continuous parameter Markov branching processes can be derived using the corresponding limit theorems for Galton-Watson processes. Each limit theorem is considered in a general context which connects the limiting behavior of an appropriate function pi(t) as t approaches infinity with that of the sequences pi(n delta), delta> 0, as n approaches infinity. (Author)

AD-614 939 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
OPTIMAL CONTROL AND CONVEX PROGRAMMING,
by J. B. Rosen. Feb 65, 25p
Technical summary rept. no. MRC-TSR-547
Contract DA11 022ORD2059; Grant NsG565
Unclassified report

Descriptors: (*Optimization, Control), (*Nonlinear programming, Control), Operations research, Convex sets, Functions, Differential equations, Topology.

A general type of discrete optimal control problem with both control and state constraints is considered. Necessary conditions for a relative minimum are given (assuming only differentiability) based on the Kuhn-Tucker theory. For a convex function and linear system of differential equations it is shown that these conditions are also sufficient for a global minimum. A computational scheme is described for the state constrained problem where the conditions are sufficient. The scheme is based on a convex programming method and determines first if any admissible control exists, and if so, finds an optimal control. The solution of a four-dimensional system with state constraints is presented in order to illustrate this computational scheme. (Author)

AD-614 952 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A NEW METHOD OF SOLVING THE PROBLEM OF LINEAR PROGRAMMING,
by K. L. Yushchenko. 15 Apr 65, 10p
FTD-TT-64-1144
TT 65-62141
Unclassified report

Unedited rough draft trans. of mono. Obchyslyuval'na Matematyka i Tekhnika (Computer Mathematics and Technology) Kiev, 1963, p40-4.

Descriptors: (*Linear programming, Optimization), Inequalities, Theory, Operations research, USSR.

Proposed is a new method of solving linear programming problems, based on the use of one of R-operations, introduced by V. L. Rvachov (On Analytical Description Of Certain Geometric Images). The assumption about the nonlinearity of inequalities is used essentially only for the purpose of simplifying the calculations. In this way, the method can be applied also to solving other problems of mathematical (nonlinear) programming. (Author)

AD-615 039 Div. 15, 22

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
TABLES OF BINOMIAL EXPANSION FOR STATISTICAL REFERENCE, VOLUME 2,
by William Schling and Larry Schmele. Jul 63, 122p
Rept. no. SAAS-48
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Statistical data, Tables), (*Binomials, Tables), Reliability, Statistical tests, Ordnance, Quality control.

AD-615 041 Div. 15

California Univ., Los Angeles.
CHARACTERIZATIONS OF STARSHAPED SETS.
Doctoral thesis,
by Eugene Elliot Robkin. Jan 65, 83p
Contract Nonr23376, Proj. NR044 144
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is not available for public sale.

Descriptors: (*Set theory, Geometric forms), Conical bodies, Spheres, Convex sets, Topology.

In 1946 Krasnosel'skii characterized compact star-shaped sets in n-dimensional Euclidean space En M. A. Krasnosel'skii, 'Sur un critere pour qu'un domain soit etoils' (Russian, French summary), Mat. Sb. (N. S.), vol. 19 (61)(1946), pp. 309-310. In doing this he utilized the notions of 'regular point' and 'visibility' together with Helly's Theorem (E. Helly, 'Uber Mengen konvexer Körper mit gemeinschaftlicher Punkten,' Jber. Deutsch. Math. Verein, vol. 32 (1923), pp. 175-176). The author introduces several new concepts which together with Helly's Theorem and some of its relatives (L. Danzer, B. Brunbaum, and V. Klee, 'Helly's Theorem and its relatives,' American Mathematical Society Symposium on Convexity, Seattle, Proc. Symp. Pure Math., vol 7, 1963) enables him to characterize several classes of starshaped sets.

AD-615 044 Div. 15

Harvard Univ., Cambridge, Mass.
A BOUNDARY VALUE PROBLEM ARISING IN THE THEORY OF UNIVALENT FUNCTIONS,
by Jerry L. Kazdan. 1964, 22p
Contract DA31 124ARO D128AROD 1617 49
Unclassified report

Pub. in Journal of Mathematics and Mechanics v13 n2 p283-303 Mar 1964 (Copies available only to DDC users).

Descriptors: (*Boundary value problems, Functions), (*Functions, Theory), Green's function, Calculus of variations, Differential equations, Mapping (Transformations), Taylor's series.

AD-615 045 Div. 15

Harvard Univ., Cambridge, Mass.
A NOTE ON THE FUNDAMENTAL THEORY OF ORDINARY DIFFERENTIAL EQUATIONS,
by George R. Sell. 19 Feb 64, 7p
AROD 1617 51
Unclassified report

Pub. in Bulletin of the American Mathematical Society v70 n4 p529-35 Jul 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Differential equations, Theory), Topology, Functional analysis, Mapping (Transformations).

In this note are presented on various problems connected with ordinary differential equations which do not necessarily satisfy a uniqueness condition. Using the concept of an integral funnel one is able to generalize the classical theorem on continuity with respect to initial conditions. This then leads to a reformulation of the problem of classifying the solutions of a given differential equation. That is, it is shown that every continuous vector field f(x) on W gives rise to a bicontinuous injection of W into a space of functions H, and consequently the problem of classifying solutions is equivalent to the problem of characterizing this family of bicontinuous injections. A detailed discussion, with proofs is to appear later. (Author)

AD-615 084 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

California Univ., Berkeley.
THE LINEARIZATION OF SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS IN THE NEIGHBORHOOD OF A PERIODIC SURFACE OR INTEGRAL MANIFOLD.
Technical rept.,
by Al Kelly, Jr. Mar 65, 21p
Contract Nonr22288, Proj. NR041 255
Unclassified report

Descriptors: (*Differential equations, Theory), Topology, Matrix algebra, Mapping (Transformations), Real variables.

The author establishes for the neighborhood of a periodic solution a theorem asserting that by a regular change of variables these equations may be linearized when the original differential equation is continuously differential. (Author)

AD-615 109 Div. 15, 12
CFSTI Prices: HC$1.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
FEASIBLE CONTROL COMPUTATIONS USING DYNAMIC PROGRAMMING.
Physical and mathematical sciences research paper,
by Stephen J. Kahne. Apr 65, 25p
Paper no. PMSRP-94, AFCRL 65-232
Proj. 4641, Task 4641 01
Unclassified report

Descriptors: (*Optimization, Control), (*Dynamic programming, Control), Calculus of variations, Feasibility studies, Sequential analysis, Operations research, Dynamics.

The application of Bellman's dynamic programming technique to realistic control problems has generally been precluded by excessive storage requirements inherent in the method. In this paper, the notion of state mobility is described and shown to be valuable in reducing certain classes of dynamic programming calculations to manageable size. The scheme requires one simple calculation at each stage of the process. In many cases even this calculation may be omitted. It results in the reduction of the range of allowable 'state' variables to be scanned. The amount of reduction varies from problem to problem. A simple example exhibits a fifty percent reduction. This corresponds to a fifty percent reduction in storage requirements for the problem. Reductions of one or two orders of magnitude appear possible for certain classes of problems. (Author)

AD-615 110 Div. 15, 12, 19
CFSTI Prices: HC$1.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
OPTIMAL COOPERATIVE STATE RENDEZVOUS AND PONTRYAGIN'S MAXIMUM PRINCIPLE.
Physical and mathematical sciences research papers,
by Stephen J. Kahne. Apr 65, 21p
Paper no. PMSRP-93, AFCRL65-233
Proj. 4641, Task 4641 01
Unclassified report

Descriptors: (*Optimization, Control), (*Calculus of variations, Control), (*Rendezvous guidance, Optimization), Nonlinear systems, Rendezvous spacecraft, Hamiltonian, Dynamics.

In the discussion of the theory of optimal cooperative rendezvous, it is shown that the problem of obtaining the optimal control of two independently controlled systems having a common goal may be solved using the Maximum Principle of Pontryagin. This will be accomplished provided certain special boundary conditions are obtained for the Hamiltonian system of differential equations. It is further demonstrated that the requirement that two state variables be equal at the rendezvous time implies that the adjoint variables associated with them are negatives of each other at that time. Using this result, a first-order time-optimal rendezvous problem is solved and the results discussed. Indications for further work are also given. (Author)

AD-615 116 Div. 15, 26
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
LIFE-TESTING RESULTS BASED ON A FEW HETEROGENEOUS LOGNORMAL OBSERVATIONS,
by A. J. McCulloch and John E. Walsh. 19 Apr 65, 18p Rept. no. SP-2038
Unclassified report

Descriptors: (*Statistical tests, Life expectancy), (*Failure (Mechanics), Quality control), Probability, Reliability, Statistical distributions, Sampling.

During some future period, a number of similar items are to be independently life-tested under 'typical' conditions. The observation for each item is its time to failure. The interest is in determining a length of time such that the probability of all the items surviving this long is at least a specified amount. The desired value is to be determined from the results of independent tests on a few items of this type, from supplementary information (tests on similar items), and from a combination of experience and judgment. All observations on items of the type to be life-tested are assumed to have lognormal distributions. The testing conditions are considered to be the same for each of the items to be life-tested later. However, each of the few items that are first considered may be subjected to different testing conditions. A consensus of these heterogeneous conditions furnishes the 'typical' conditions that are used for the items tested later. The statistical method consists in utilizing the few observations to allow for mean effects, and in evaluating an upper bound for the variation effects from supplementary information, experience, and judgment. This approach can have strong advantages when there are only two or three observations. (Author)

AD-615 132 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
SOLUTION OF CERTAIN NON-AUTONOMOUS DIFFERENTIAL EQUATIONS BY SERIES OF EXPONENTIAL FUNCTIONS,
by Michael Golomb. 16 Sep 57, 34p
Technical summary rept. no. MRC-TSR-10
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Differential equations, Series), (*Series, Differential equations), (*Special functions (Mathematical), Series), Matrix algebra, Real numbers.

AD-615 140 Div. 15, 25

California Univ., Berkeley.
THE SCHWINGER VARIATION METHOD.
Revised ed.,
by Edmund Pinney. 8 Jul 64, 13p
Unclassified report

Pub. in J. Society for Industrial and Applied Mathematics v12 n4 p873-85 Dec 1964 (Copies not available to DDC or Clearinghouse customers)
Revision of manuscript submitted 8 Jul 63.

Descriptors: (*Integral equations, Calculus of variations), (*Boundary value problems, Integral equations), Electromagnetism, Acoustics, Elasticity, Differential equations, Waveguide windows, Numerical methods and procedures.

The Schwinger variation method is removed from its customary setting in Green's function theory, and is approached from the integral equations viewpoint. The traditional Schwinger theory is improved upon in two respects. Error bounds are provided for the approximations to A(f), a function determining waveguide transmission and reflection coefficients due to diaphragms containing windows. A method, involving quadratures only, is provided and will improve the accuracy of this approximation as much as desired.

AD-615 146 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Washington Univ., Seattle.
COHOMOLOGY AND DEFORMATIONS IN GRADED LIE ALGEBRAS,
by Albert Nijenhuis and R. W. Richardson, Jr.
May 65, 50p Technical rept. no. TR-24
Contract Nonr47715, Proj. NR043 186
Unclassified report

Prepared in cooperation with Pennsylvania Univ., Philadelphia, Grant NSF GP1905.

Descriptors: (*Algebraic topology, Groups (Mathematics)), (*Algebras, Groups (Mathematics)), Algebraic geometry, Mapping (Transformations), Theorems.

The theories of deformations of associative algebras, Lie algebras, and of representations and homomorphisms of these all show a striking similarity to the theory of deformations of complex analytic manifolds. The common context of all these turns out to be the problem of deforming one single element x of degree one in a graded Lie algebra subject to the condition $(x,x) = 0$. The first part of this report gives general properties of graded Lie algebras over fields of characteristic not 2; the second part deals with the case of characteristic 2. The third and fourth parts give general theorems on deformability for the respective cases when the base field is the real or complex numbers (analytic methods), and general algebraically closed fields (algebraic methods). It is shown that deformability is to a large extent determined by certain cohomology groups and mappings of these. (Author)

AD-615 166 Div. 15, 25, 30
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MATHEMATICAL ASPECTS OF THE THEORY OF SYSTEMS,
by Richard Bellman. May 65, 22p
Rept. no. P-3032
Unclassified report

Paper presented at the System Theory Symposium, Polytechnic Inst. of Brooklyn, N. Y., 20 Apr 65.

Descriptors: (*System engineering, Mathematics), (*Mathematics, System engineering), Theory, Control, Operations research, Identification, Scientific research.

AD-615 167 Div. 15, 18
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
VARIANCE REDUCTION TECHNIQUES,
by W. L. Maxwell. 6 May 65, 13p
Rept. no. P-3139

Unclassified report

Rept. prepared for presentation at the Simulation Panel of the Department of Defense Logistics Conference, Warrenton, Va., 26-28 May 65.

Descriptors: (*Analysis of variance, Sampling), (*Stochastic processes, Simulation), Monte Carlo method, Operations research, Logistics, Queueing theory, Management planning.

A variance reduction technique is a procedure which is used in a sampling experiment to reduce the underlying variance of the sample estimates. Such techniques have been used for decades by workers in the social sciences. Kahn, in RM-1237-AEC, presented a catalog of techniques applicable to Monte Carlo sampling experiments. Yet seldom are these techniques employed in the simulation of stochastic processes. The intent is to present some of the most fruitful variance reduction techniques and to explore their applicability to sampling the simulation of a stochastic process. (Author)

AD-615 175 Div. 15, 9, 30
CFSTI Prices: HC$1.00 MF$0.50

Operations Research Center, Univ. of Calif., Berkeley.
ON SIMPLE FINITE CAPACITY DAMS AND QUEUES,
by G. F. Yeo. 13 Aug 64, 16p
ORC-64-19(RR)
Grant GP2633

Unclassified report

Descriptors: (*Dams, Operations research), (*Queueing theory, Operations research), Mathematical models, Time studies, Management planning, Stochastic processes.

16. Medical Sciences

AD-614 587 Div. 16, 10
CFSTI Prices: HC$2.00 MF$0.50

Ohio State Univ., Columbus.
ACUTE HEPATOTOXICITY AND ENZYMATIC RESPONSE TO HYDRAZINE AND 1, 1-DIMETHYLHYDRAZINE IN RATS.
Final rept. for Sep 63-May 64,
by Charles F. Reinhardt and Mildred K. Pinkerton.
Feb 65, 40p
Contract AF33 657 1698, Proj. 6302
AMRL TR-65-19

Unclassified report

Descriptors: (*Hydrazine, Toxicity), (*Toxicity, Hydrazine), (*Dimethyl hydrazine (1-1), Toxicity), Enzymes, Oxidoreductases, Adaptation (Physiology), Toxic tolerances, Blood serum, Liver, Carbon tetrachloride, Pathology, Rats.

The in vivo and in vitro effects of hydrazine and of 1, 1-dimethylhydrazine (UDMH) on blood serum and liver tissue enzyme activities were studied. The specific enzymes investigated were lactic dehydrogenase, isocitric dehydrogenase, malic dehydrogenase, and glumatic acid dehydrogenase. Activity levels were determined at 16, 24, 48, and 72 hours after intraperitoneal administration of the toxic agents to rats. Attempts were made to correlate enzyme levels with altered liver pathology. Results were compared with a concomitant study of the effects of carbon tetrachloride on the same enzymes and on liver pathology. Results indicated that the mechanisms of toxic action for these three chemical agents are probably dissimilar and that serum enzyme levels may not provide sensitive indications of altered liver pathology in the case of hydrazine or UDMH. (Author)

AD-614 590 Div. 16

Oxford Univ. (England).
THE HYPOTHALAMUS AND HORMONAL ACTIVITY.
Final rept. for 1 Apr-30 Sep 64,
by G. W. Harris. 30 Sep 64, 9p
Grant AF EOAR64 3
AFOSR 65-0667

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Thalamus, Hormones), (*Hormones, Physiology), Pituitary gland, Pituitary hormones, Estrogens, Testosterone, Thyroid hormones, Secretion, Thyroid gland, Stimulation, Toxicity, Embryology, Pregnancy, Chlorpromazine, Barbiturates, Rabbits, Rats, Great Britain.

Contents:
The release of luteinizing hormone (LH) in the rabbit; Investigation of the releasing factor content of portal vessel blood; Studies on ovulation in immature rats; A study of the concentration, and activity, of thyrotrophic hormone in blood; TSH in thyrotoxicosis; A comparative study of TSH and LATS; A study of placental embryology and TSH; A study of the blood level of thyrotrophic hormone in response to stress and electrical stimulation.

AD-614 663 Div. 16, 26

Pittsburgh Univ., Pa.
STATISTICAL METHODOLOGY FOR INCREASING THE EFFICIENCY, THE OCCUPANCY RATE, AND PREDICTING THE BED REQUIREMENTS OF THE OBSTETRICAL UNIT.
Master's thesis,
by George A. Huber. 1965, 147p

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Hospitals, Management planning), (*Management planning, Hospitals), (*Birth, Hospitals), Medical equipment, Scheduling, Probability, Statistical data, Statistical analysis, Least squares method, Medical personnel, Pregnancy, Costs, Graphics.

The purpose of the research is to (1) review the idea of the grouping of obstetrical units for decreasing the duplication of maternity facilities and increasing maternity occupancy rates; (2) introduce inter-hospital cooperation and the admission of other than maternity patients to the maternity suite as solutions to increase obstetrical occupancy rates and decrease obstetrical occupancy rate fluctuations; (3) demonstrate the feasibility of analyzing random processes within hospitals and statistically examining factors involved with human behavior; (4) offer analytical methods and techniques for attacking hospital problems. (Author)

AD-614 669 Div. 16
CFSTI Prices: HC$3.00 MF$0.75

Ohio State Univ., Columbus.
IMMUNOLOGIC STUUDIES OF RATS INFECTED WITH PLASMODIUM BERGHEI.
Master's thesis,
by Dana Allen Dilley. 1965, 82p
Grant PHS AI06108 01

Unclassified report

Descriptors: (*Plasmodium, Immunity), Parasitic diseases, Hemosporidia, Diseases, Antigens and antibodies, Hematology, Erythrocytes, Infections, Trypsin, Desoxyribonucleic acids, Ribonucleic acids, Blood plasma, Rats, Tables.

Fifteen white, Wistar rats were infected with Plasmodium berghei of the KBG 173 strain and their serologic and hematologic reactions were studied. Nine similar non-infected rats were studied as controls. Only one of the infected rats survived. During the course of the experiment all of the rats exhibited a reticulocytosis and a decrease in the per cent packed cell volume. These changes were more pronounced in the infected animals. Only those rats which had been infected with P. berghei produced detectable antibodies for RNA, trypsinized rat erythrocytes, and DNA. The normal animals did not produce detectable amounts of antibody. The failure of the control animals to produce antibody would seem to indicate that the antibodies were produced as a result of the P. berghei infection and were not caused solely by the blood loss incurred through sample collection. The results obtained in this experiment indicated that serum factors specific for host tissue components develop in rats infected with P. berghei. (Author)

AD-614 702 Div. 16, 15
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
NONLINEAR DIFFERENTIAL EQUATIONS IN CIRCULATORY SYSTEM MODELLING,
by Walter J. Brinks. 10 Feb 65, 25p
Rept. no. TR-1244
Projs. 1P222901A207, 16100

Unclassified report

Descriptors: (*Cardiovascular system, Mathematical models), (*Nonlinear differential equations, Cardiovascular system), Blood circulation, Relaxation oscillators.

Nonlinear differential equations are suggested as models in the large of the circulatory system. The response of a particular second-order differential equation is examined with respect to changes in external resistance and system mass; approximate analogues are suggested between this response and that of the heart-blood network complex. (Author)

AD-614 709 Div. 16

Naval Biological Lab., Univ. of California, Oakland.
INTERNATIONAL SYMPOSIUM ON AEROBIOLOGY (1st) WAS CONVENED OCTOBER 2, 3, 4 AND 5, 1963 AT ALUMNI HOUSE, UNIVERSITY OF CALIFORNIA, BERKELEY,
by Stewart H. Madin. 1963, 421p
Unclassified report

Copies available from Symposium Editor, Naval Biological Laboratory, Naval Supply Center, Oakland, California 94614, $4.50.

Descriptors: (*Aerobiology, Symposia), Pathology, Medicine, Ecology, Public health, Bacteria, Aerosols.

Topics include: medical and public health, ecology, experimental and technical aerobiology, survival and viability.

AD-614 729 Div. 16

Naval Dental School, Bethesda, Md.
EXAMINATION OF ACID SOLUBILITY PROTECTION AFFORDED TEETH BY STANNOUS FLUORIDE DENTIFRICES,
by L. W. Wachtel and C. G. Strange, Jr. 10 Jun 63, 7p
Unclassified report

Pub. in Journal of Dental Research v44 n1 p3-9 Jan-Feb 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Teeth, Solubility), (*Toilet articles, Effectiveness), (*Tin compounds, Fluorides), (*Fluorides, Toilet articles), Test methods, Acids, Iodine.

An in vitro technique is described for determining the per cent reduction in acid solubility afforded the etched enamel tooth surface following treatment with different substances, This reduction, expressed as percent protection, was determined for topically applied stannous fluoride solutions, for stannous fluoride dentifrices, and for solutions of the fluoride ion at an acid pH. The protection afforded by three commercial stannous fluoride dentifrices was measured in vitro at a pH of 4.6-5.1. This protection was compared with that afforded by solutions containing an equivalent amount of stannous fluoride and by solutions containing an equivalent amount of fluoride ion. Commercial stannous fluoride dentifrices, as 1:1 slurries with water, provided the same protective effect against acid solubility that was obtained with a water solution containing one-tenth the amount of stannous fluoride. Solutions at pH 4.1-4.6 that contained no stannous ion but had a fluoride concentration equivalent to 0.2-0.4 per cent stannous fluoride also provided a protection to the etched tooth surface comparable to that of the dentifrices. (Author)

AD-614 730 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
USE OF CHIMPANZEES IN THE STUDY OF INFECTIOUS HEPATITIS IN MAN,
by Jack D. Douglas and T. O. Berge. 1964, 9p
Unclassified report

Pub. in AVMA Scientific Proceedings 101st Annual Meeting p243-51
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Laboratory animals, Chimpanzees), (*Infectious hepatitis, Etiology), Virus diseases, Tissue culture, Liver, Humans.

Attempts were made to produce observable illness in chimpanzees by inoculating them with viral agents isolated in tissue-culture (TC) systems from clinically and histologically diagnosed cases of infectious hepatitis (IH) in man. Results of clinical, histologic, and virologic studies did not afford conclusive evidence that chimpanzees were susceptible to the agents tested, but these results were encouraging enough to indicate that further studies should be conducted. (Author)

AD-614 741 Div. 16

Catholic Univ., Santiago (Chile).
PEPTIDE NEUROHUMORS IN THE BRAIN.
Final rept. for 1 Oct 59-30 Sep 64,
by Hector Croxatto. Jan 65, 7p
Contract AF49 638 584; Grant AF AFOSR447 63,
Proj. 9777, Task 977701
AFOSR 65-0671
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Brain, Peptides), (*Peptides, Brain), Thalamus, Pituitary hormones, Ascorbic acid, Rats, Ovaries, Chile.

Research progress is reported, along with a list of papers and communications published. Significant amounts of peptide substances displaying neurohypophysial activity were found to exist in the human hypothalamus. Peptides having oxytocinand vasopressin-like activity were found in the antero hypophysis. From diverse areas of the brain, it was found possible to obtain extracts capable of inducing depletion of the ovarian ascorbic acid in rats prepared according to the Parlow test. Studies were carried out on an active material which displays peptide nature and which induces pharmacological effects on diverse biological preparations. An LH activity was found in the human hypothalamus.

AD-614 751 Div. 16

Army Tropical Research Medical Lab., APO 851, New York.
MOLLUSCICIDAL QUALITIES OF THREE ORGANOTIN COMPOUNDS REVEALED BY 6-HOUR AND 24-HOUR EXPOSURES AGAINST REPRESENTATIVE STAGES AND SIZES OF AUSTRALORBIS GLABRATUS,
by Lyman P. Frick and Wilma Q. de Jimenez.
1964, 3p
Unclassified report

Pub. in World Health Organization. Bulletin (Switzerland) v31 p429-31 1964 (Copies available only to DDC users)
Supported by a contract between World Health Organization and Puerto Rico Univ.

Descriptors: (*Gastropoda, Toxic tolerances), (*Molluscacides, Effectiveness), (*Tin compounds,

Toxicity), Metalorganic compounds, Acetates, Oxides, Lethal dosage.

Tri-n-butyl tin acetate and tri-n-propyl tin oxide were to have similar toxic effects on Australorbis glabratus, with the LC-½ values ranging from 0.033 to 0.054 ppm for newly hatched snails to 0.1 to 0.13 ppm for 13-15 mm snails. Tri-n-propyl tin oxide was the more effective against 4-day eggs. Tri-n-phenyl tin acetate was considereably less effective than the other two compounds tested, and probably no longer merits consideration as a potential molluscicide.

AD-614 754 Div. 16

California Univ., San Francisco. Medical Center.
ALVEOLAR DUCT CONSTRICTION AFTER BARIUM SULFATE MICROEMBOLISM,
by Jay A. Nadel. 1964, 9p
Contract Nonr22255; Grant PHS HE 0 6358
Unclassified report

Research partly supported by the California State Department of Public Health.
Pub. in Pulmonary Embolic Disease p153-61 nd
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Embolism, Lungs), (*Lungs, Contraction), (*Barium compounds, Sulfates), Heart, Injection, Throat, Stimulation, Histamine, Histology, Sympathomimetic agents, Antispasmotic agents, Amines, Alcohols, Muscles, Nerves, Surgery, Heparin, Atropine, Guanidines, Carbon dioxide, Respiration.

Right heart injection of barium sulfate increased pulmonary resistance, decreased pulmonary compliance and functional residual capacity, and increased end-expiratory transpulmonary pressure and anatomic dead space. Right heart injection of histamine or 48/80 had effects on the mechanical properties of the lungs similar to those of barium sulfate. Intravenous isoproterenol partially or completely prevented the changes following microemboli, suggesting that they were due to contraction of the smooth muscle. Vagotomy, injection of heparin or atropine or guanethedine, or inhalation of 6 per cent carbon dioxide did not prevent the changes; prior injections of 48/80 decreased the extent of changes, suggesting that the embolism-induced changes depend on histamine release. The varied manifestations of barium sulfate microemboli may depend on the presence and extent of contraction of peripheral respiratory units induced by liberation of histamine. Mechanical irritation of the larynx increased the pulmonary resistance and decreased anatomic dead space without affecting pulmonary compliance significantly. These changes were prevented by bilateral cervical vagotomy. Anatomic studies after electrical stimulation of the pheripheral or cervical vagus nerve showed constriction of the bronchi on the involved side. The alveolar ducts were not constricted. (Author)

AD-614 758 Div. 16, 2

Oregon State Univ., Corvallis.
BIOLOGICAL AND CHEMICAL FEATURES OF TIDAL ESTUARIES,
by Herbert F. Frolander. 1964, 12p
Technical rept. no. TR-52, Ref-64-37
Contract Nonr128610; Grant NSF GP622
Unclassified report

Pub. in Journal Water Pollution Control Federation v36 n8 p1037-48 Aug 1964 (Copies not available to DDC or Clearinghouse customers)
Presented at the Annual Meeting of the Water Pollution Control Federation (36th) held in Seattle, Wash., 6-10 Oct 63.

Descriptors: (*Estuaries, Ecology), (*Ecology, Estuaries), (*Marine biology, Estuaries), Tidewater, Rivers, Tides, Plankton, Physical properties, Chemical properties, Seacoast.

Relationships between zooplankton populations and estuary characteristics are illustrated principally using data from two mid-latitude estuaries on the coasts of the United States; one is Yaquina Bay, Oregon, a land-locked estuary; the other is Narragansett Bay, Rhode Island, a relatively openmouthed estuary.

AD-614 789 Div. 16
CFSTI Prices: HC$4.00 MF$0.75

Naval School of Aviation Medicine, Pensacola, Fla.
BIOTELEMETRY OF THE TRIAXIAL BALLISTOCARDIOGRAM AND ELECTROCARDIOGRAM IN A WEIGHTLESS ENVIRONMENT,
by W. Carroll Hixson and Dietrich E. Beischer.
8 Sep 64, 108p Mono no. 10
NASA Order-R-20
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Telemeter systems, Weightlessness), (*Electrocardiography, Telemeter systems), (*Ballistocardiography, Telemeter systems), Cardiovascular system, Space medicine, Acceleration, Respiration, Stress (Physiology), Telemetering data, Pilots, Gravity, Motion, Airborne, Instrumentation, Telemetering transmitters.

Biotelemetry instrumentation was developed to record the cardiac-originated inertial accelerations of a subject freely floating in the weightless environment realized in a jet aircraft flying a Keplerian trajectory. The weightless state served as an ideal suspension system and allowed unrestricted motion of the subject with six degrees of freedom. The report describes in detail the design and development of the Constraint Platform with attached Biotelemetry Module used to transduce, signal condition, and telemeter the physiological measurements. A similar description is given of the airborne receiving station used to receive, display, and store the telemetered data. Linear and angular acceleration measurements were performed with this equipment and the results represent the first recording of a triaxial inertial acceleration ballistocardiogram. Triaxial electrocardiographic data were simultaneously measured and telemetered to permit correlation of the mechanical and electrical events of the cardiac complex. The linear acceleration patterns were also displayed in loop form and in a three-dimensional arrangement to facilitate interpretation of their spatial relationship. (Author)

AD-614 833 Div. 16
CFSTI Prices: HC$5.00 MF$1.00

Space/Defense Corp., Birmingham, Mich.
ENGINEERING FEASIBILITY STUDY FOR THE ARTICULATING CENTRIFUGE CONCEPT.
Final rept. for Jun-Oct 64,
by Michael Brian. Dec 64, 177p
Contract AF33 615 1893, Proj. 7231, Task 723101
AMRL TR-64-138
Unclassified report

Descriptors: (*Centrifuges, Feasibility studies), Gravity (Aritifcial), Acceleration, Coriolis effect,

Gears, Drag, Weight, Configuration, Control systems, Space medicine, Flight simulators, Mathematical analysis, Structures, Theory, Engineering, Design, Specifications.

The report introduces a unique concept for a device capable of generating a variety of G-time profiles and utilizing present state-of-the-art techniques and commercially available components. The physical appearance of the design concept is dealt with initially and a determination made of the most suitable configuration. An examination of the structural weight and stresses developed is included to indicate feasibility. This includes comparison of requirements for a 15-, 50-, or 150-pound payload with the rationale for selection of the 50-pound option with a 12-foot radius of rotation for more intensive study. The dynamics of operation are analyzed and the various characteristics examined. Coriolis forces generated are reasonably small and can be considered a minor perturbation on the overall G-time exposure curve. The operating mechanisms controlling the centrifuge are described in appropriate detail and critical features noted. Auxiliary and ancillary equipment are also discussed as well as the basic building requirements for housing the centrifuge. A set of design specifications is included. (Author)

AD-614 850 Div. 16

Boston Univ. Medical Center, Mass.
ADULT ACQUIRED TOLERANCE TO HOMOGRAFTS.
Annual progress rept. for 1 Aug 64-31 Jul 65,
by Richard H. Egdahl. 31 Jul 65, 26p
Contract DA49 193MD2621
Unclassified report

Reports from Medical Coll. of Virginia, Richmond, Subcellular Transplantation Antigen Derived from Dog Spleen Cells Cultivated in Vitro, and Failure of RNA to Inhibit Rejection of Skin Homografts, pub. in Society for Experimental Biology and Medicine. Proceedings, v116 p445-8 and 1064-7 1964, and A Transplantation Antigen Recovered from Cell Culture Medium, pub. in Transplantation v2 n3 p321-33 May 1964. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Antigens and antibodies, Transplantation), (*Transplantation, Antigen-antibody reactions), Immunity, Tolerances (Physiology), Tissue culture cells, Spleen, Skin, Kidneys, Stability, Ribonucleic acids, Dogs, Rabbits, Adults.

Major activity was centered around studies of a subcellular transplantation antigen derived from dog or rabbit spleen cells cultivated in vitro. It was found that millipore-filtered tissue culture medium in which dog spleen cells were grown contained subcellular material with transplantation antigenic activity which could be concentrated by ultracentrifugation. Antigenic activity was demonstrated by the accelerated rejection of kidney homotransplants by recipients of antigen from the original spleen donor. This material was non-toxic when infused intravenously. The material consistently induced transplantation immunity in rabbits, as indicated by the accelerated rejection of test skin homografts from the donors of cultured spleen cells. Antigenic activity was stable to heating (56 degrees), to freezing and thawing 3 times, lyophilization, and to the action of trypsin. Recent studies indicate that a combination of daily intravenous injections of antigen along with a course of 6-MP therapy results in prolongation of skin homografts in rabbits. A second portion of the studies involved determining the effect of intravenous infusion of donor lymphoid RNA on skin homograft survival in rabbits. There was no effect by the RNA infusions. (Author)

AD-614 855 Div. 16

Naval Medical Research Inst., Bethesda, Md.
ABNORMAL CLYPEAL SPINES ON LARVAE OF CULEX (CULEX) SITIENS WIEDEMANN,
by Leo A. Jachowski, Jr. 1964, 3p
Research rept. MR-005.09-1033.01-R-6
Unclassified report

Pub. in Mosquito News v24 n2 p221-2 Jun 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Culex, Larvae), (*Larvae, Morphology (Biology)), Embryos.

Abnormalities are described for larvae of C. sitiens collected in American Samoa. Emphasis is placed upon the frequency of their occurrence. Nearly 20 percent of the larvae examined had some deformity of the clypeal spines. Teratology (abnormal development of the embryo) is the likely cause. The malformations may have been genetically transmitted. The recovery of such larvae from collections made over a period of 13 months suggests this possibility. (Extracted)

AD-614 856 Div. 16

Naval Medical Research Inst., Bethesda, Md.
ANAPHYLACTOID REACTION OF THE MOUSE TO DEXTRAN,
by Richard Anderson and Esther Hardenbergh.
3 Jul 64, 4p Research rept. MR-005.01-0021.01-R-5
Unclassified report

Pub. in Proceedings of the Society for Experimental Biology and Medicine v117 p565-7 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Dextran, Allergy), (*Mice, Allergy), (*Allergy, Dextran), Plasma substitutes, Immunology, Laboratory animals, Selection, Anesthesia, Barbiturates, Epinephrine, Ethers, Antihistaminics.

The mouse was found to exhibit signs of an anaphylactoid reaction to partially hydrolyzed dextrans of 41,000 and 80,000 average molecular weight. In the unanesthetized animal the reaction was characterized by minimal clinical symptoms and markedly increased capillary permeability detected by T-1824 blueing of the skin, but in animals under barbiturate anesthesia it resulted in cyanosis and death. The reaction was prevented by epinephrine, ether, and Phenergan, and was not evoked by administration of other plasma volume expanders. It is suggested that the mouse is not the most suitable experimental animal for use in evaluating low molecular weight dextran as a therapeutic agent, as the anaphylactoid reaction may interfere with and confuse the interpretation of any possible therapeutic effects. (Author)

AD-614 871 Div. 16, 15, 30

Chicago Univ., Ill.
ABSTRACT BIOLOGICAL SYSTEMS AS SEQUENTIAL MACHINES: II, STRONG CONNECTEDNESS AND REVERSIBILITY,
by Robert Rosen. 27 Sep 63, 8p
Grants AF AFOSR9 64, PHS GM K3 18 431
Unclassified report

Pub. in Bulletin of Mathematical Biophysics v26 p239-46 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Biology, Set theory), (*Set theory, Biology), (*Automata, Set theory), Mapping (Transformations), Mathematical models, Combinatorial analysis.

It was previously shown that the abstract biological systems called (M,R)-systems could be regarded formally as sequential machines, and that when this was done, the reversibility of environmentally induced structural changes in these systems was closely related to the strong connectedness of the corresponding machines. In the present work it is shown that the sequential machines arising in this way are characterized by the property that the size of the input alphabet is very small compared with the size of the set of states of the machine. It is further shown that machines with this property almost always fail to be strongly connected. Therefore, it follows that one of the following alternatives holds: either most environmentally induced structural alterations are not environmentally reversible, or else many mappings in the category from which the (M,R)-systems are formed must not be physically realizable. (Author)

AD-614 872 Div. 16, 15, 30

Chicago Univ., Ill.
TOWARD AN OPTIMAL DESIGN PRINCIPLE IN RELATIONAL BIOLOGY,
by H. M. Martinez. 30 Jan 64, 15p
Grant AF AFOSR9 64
Unclassified report

Pub. in Bulletin of Mathematical Biophysics v26 p351-65 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Biology, Set theory), (*Set theory, Biology), (*Vulnerability, Set theory), Design, Optimization, Binary arithmetic, Topology, Ribonucleic acids, Mapping (Transformations).

A vulnerability criterion is posed for a biological system within the context of representing the system as a relational set, i.e., a collection of components whose interdependency is described by means of a set of binary relations. The criterion provides a numerical value for each representation and therefore a means for comparing one representation against another. Choice of the criterion is such that the larger a numerical value a representation has then the less vulnerable to destruction is the system represented. Other things being equal, it is argued that the representation which endows the system with the least vulnerability is more likely to be a valid representation. A selection criterion is thereby achieved for narrowing down the choice of a priori representations. (Author)

AD-614 878 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
HORIZONS IN NEURPATHOLOGY,
by Kenneth M. Earle. 1962, 13p
Unclassified report

Pub. in Horizons in Neurological Education and Research p1-13. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Neurology, Reviews), (*Nervous system, Diseases), (*Pathology, Nervous system), Medical equipment, Histology, Histological techniques.

A general review is given of the progress and techniques in the field of neuropathology.

AD-614 879 Div. 16

Letterman General Hospital, San Francisco, Calif.
PULMONARY EMBOLISM AS A CAUSE OF SYSTEMIC HYPOTENSION AND SHOCK,
by Loren F. Parmley, Jr., Robert L. North, and George E. Pickens. 1964, 12p
Proj. 6X97 87 001
Unclassified report

Pub. in American Journal of Cardiology v15 n3 p333-44 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hypotension, Etiology), (*Shock (Pathology), Etiology), (*Embolism, Lungs), Thrombosis, Blood coagulation, Autonomic nervous system, Surgery, Nerves, Sympathomimetic agents, Amines, Vasoactive agents, Alcohols, Antispasmodic agents.

Experimental pulmonary thromboembolism in dogs supports the clinical observation that severe systemic arterial hypotension and death may result from a relatively small embolus. Severe systemic arterial hypotension, in contrast to pulmonary hypertension, is a variable acute hemodynamic alteration of pulmonary clot embolism. It is theorized that systemic arterial hypotension resulting from pulmonary embolism, exclusive of that caused by the massive pulmonary embolus, is initiated by a vasodepressor response mediated by the vagus and that recovery is dependent in part upon the ability of the peripheral vascular bed to react appropriately with reflex vasoconstriction. The value of the sympathomimetic amines, isoproterenol and metaraminol were assessed in the treatment of postembolic shock. The value of a pressor agent in contrast to one that decreases peripheral vascular resistance is emphasized.

AD-614 911 Div. 16
CFSTI Prices: HC$2.00 MF$0.50

American Inst. of Biological Sciences, Washington, D. C.
COOPERATIVE SHARK TAGGING STUDY OFF THE PACIFIC COAST OF MEXICO,
Final rept. for 1 Nov-30 Dec 64,
by Susumu Kato and Stewart Springer. 30 Dec 64, 39p
Contract Nonr452601, Proj. NR104 832
Unclassified report

Descriptors: (*Ecology, Fishes), (*Fishes, Identification), (*Labels, Fishes), Pacific Ocean, Mexico, Handling, Marine biology.

The report is concerned solely with the shark-tagging cruise undertaken November 1-December 30, 1964. This study was undertaken to gain knowledge about the migration and growth rates of some eastern Pacific sharks by means of tagging, with a corrolary objective of determining which of the many types of tags are best suited for tagging sharks. Tagging efforts were concentrated on the larger species, especially those of the genus Carcharhinus. These sharks are important as commercially desirable species in Mexico, and as detrimental pests in the American and Mexican tuna, mackerel, and shrimp fisheries. The Bureau of Commercial Fisheries Tuna Resources Laboratory launched a study in 1962 to learn the causes, effects, and possible remedies to the problem of shark attacks on purse seine nets. Mexican biologists are interested in the life history of sharks because of their commercial importance. The goals of this cooperative study, then, is expected to yield information which will be of functional value as well as contributing knowledge to a little-known field of shark biology.

AD-614 912 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Freie Universitaet Berlin (West Germany). Physiologisches Institut.

RESEARCH ON VOLUME CONDITIONED STIMULI AFFECTING SALT AND WATER EXCRETION.
Rept. no. 2 (Final) for 1 Feb 64-31 Jan 65,
by Otto H. Gauer. 21 Mar 65, 3p
Grant AF EOAR64 16
AFOSR 65-0669

Unclassified report

Descriptors: (*Excretion, Stimulation), Salts, Water, Conditioned reflex, Volume, Control, Osmosis, West Germany.

A bibliography is given of the six published papers, involving fluid volume control and the physiologic effects of water immersion, where generated under the auspices of the grant.

AD-614 946 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE DOCTOR PROPOSES, THE PHYSIOLOGIST INVESTIGATES AND THE CONSTRUCTOR CREATES,
by L. Kokin. 15 Apr 65, 21p FTD-TT-64-1089
TT 65-62135

Unclassified report

Unedited rough draft trans. of Nauka i Zhizn' (USSR) v31 n3 p82-9 1964.

Descriptors: (*Medical equipment, Electrocardiography), (*Electrocardiography, Medical personnel), Heart, Diagnosis, USSR.

A nontechnical discussion is presented concerning Ivan Akulinichev and his involvement in the development of electrocardiography.

AD-614 962 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF ADENOSINETRIPHOSPHORIC ACID (ATP) ON THE METABOLISM OF PHOSPHOPROTEINES IN THE LIVER AT RADIATION INFLICTION,
by R. P. Vinogradova. 12 Apr 65, 12p
FTD-TT-64-1163
TT 65-62151

Unclassified report

Unedited rough draft trans. of Ukrayins'kyi Biokhimichnyi Zhurnal (USSR) v35 n2 p274-9 1963.

Descriptors: (*Radiobiology, Phosphoproteins), (*Phosphoproteins, Radiation effects), (*Adenosine phosphates, Radiobiology), Phosphorus, Metabolism, X rays, Lethal dosage, Tissues (Biology), Liver, Guinea pigs, Radiation sickness, USSR.

During the incubation of normal liver tissue, when ATP is added in amount of 0.35 m moles per 1 g of tissue are observed increases in the amount and intensity of restoration of phosphoproteine phosphorus. During the incubation of samples from liver tissues of animals exposed to lethal dosage of x-ray radiation, the addition of ATP does not affect the content nor intensity of restoration of phosphoproteine phosphorus. The content of ATP in the liver decreases considerably after the animals are exposed to x-ray radiation of lethal capacity. Maximum reduction in amount of ATP is observed on the tenth day of radiation illness. Under the effect of general x-ray radiation the content of phosphorus in phosphoproteines drops on an average to 30-35%, and the restoration intensity in comparison with standard rise on an average by 20% in all investigated periods after the exposure. The content of inorganic phosphorus in liver of exposed animals rises on an average by 20-35%, and the specific activity remains without changes. (Author)

AD-614 970 Div. 16, 30
CFSTI Prices: HC$1.00 MF$0.50

IIT Research Inst., Chicago, Ill.
DEVELOPMENT OF AN ORALLY EFFECTIVE INSECT REPELLENT.
Quarterly progress rept. for 1 Feb-30 Apr 65,
by Philip Kashin. 30 Apr 65, 20p
Rept. no. IITRI-L6021-2
Contract DA49 193MD2281, Proj. L6021

Unclassified report

Descriptors: (*Insect repellents, Effectiveness), (*Culicidae, Insect repellents), (*Bites and stings, Electronic recording systems), Test methods, Laboratory equipment, Design, Mice.

An electronic device was developed that can accurately detect and record the probing, penetration, engorging, and withdrawal of a mosquito in relation to its host. Each act is distinct and can be separately recognized in the recording of a single mosquito bite. The chart recordings were correlated with the physiological events taking place within the mosquito during engorgement and salivation. It may be possible to quantify the apparatus in terms of the actual number of mosquitoes biting simultaneously. (Author)

AD-614 987 Div. 16, 28

California Univ., Los Angeles.
CONDITIONED RESPONSE STUDIES OF CETACEANS.
Final rept.,
by Kenneth S. Norris and Ronald N. Turner. 1964, 22p
Grant Nonr G0007 64 Unclassified report

Includes Open Ocean Diving Test with a Trained Porpoise (Steno Bredanensis), Howard A. Baldwin and Dorothy J. Samson. Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Cetacea, Behavior), Training, Growth, Marine biology, Ecology, Swimming, Hearing, Ear, Conditioned reflex, Physiology, Fear, Sound.

The research was planned to attack four major problem areas of cetacean biology, using conditioned response techniques. These were: (1) To develope a porpoise that could be released and retrieved in the open ocean, using conditioned response trainingand sound retrieval cueing. (2) To measure the maximum swimming speed in this animal using an open water timing range. (3) To measure diving depth using the trained animal and a depth telemeter. (4) To carry out detailed dissections and description of a putative lower jaw waveguide system, and its relation to the inner ear.

AD-615 009 Div. 16
CFSTI Prices: HC$2.00 MF$0.50

American Foundation for Biological Research, Madison, Wis.
THE DISTRIBUTION OF ICE IN FROZEN TISSUES OF FROGS AND MICE,
by B. J. Luyet, M. Ross, P. M. Gehenio, and J. Nath.
Dec 64, 37p
Contract AF41 657 343, Proj. 8241, Task 824102
AAL TDR-63-28 Unclassified report

Descriptors: (*Tissues (Biology), Freezing), (*Ice, Tissues (Biology)), Histological techniques, Distribution, Skin, Muscles, Mice, Amphibians, Particle size, Low-temperature research.

It was found that with skin and digits: (1) The ice particles formed in corresponding strata are generally larger when the freezing temperature is higher. (2) A progressively greater proportion of the organ remains free of ice at the higher freezing temperatures. (3) The only parts of the skin and digit free of ice at all temperatures are the stratum corneum in both the frog and the mouse, the stratum compactum in the frog and the fibrous sheath of the mouse tendon. (4) The epidermis is almost entirely free of ice in frog skin at -1C and in mouse skin at -2C. (5) When ice is formed, the particles are 'very small' in the epidermis, 'medium' to 'large' in the loose connective tissue of the dermis and 'medium' to 'large' in the horizontal connective tissue of the dermis. (6) Ice is present in the tendon of the frog at -5C and -3C, and in that of the mouse at -5C. With excised internal organs it was found that: ice is present throughout the organs frozen at -4C or -5C. (Author)

AD-615 010 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Bryn Mawr Coll., Pa.
EFFECT OF COLD ON BLOOD CLEARANCE OF CARBON AND BACTERIA OF DIFFERENT VIRULENCE,
by L. Joe Berry and Dorothy S. Smythe. Jan 65, 19p
Contract AF41 609 1764, Proj. 8241, Task 824101
AAL TDR-64-14

Unclassified report

Descriptors: (*Blood chemistry, Temperature), (*Stress (Physiology), Infectious diseases), (*Bacteria, Blood chemistry), (*Carbon, Blood chemistry), Salmonella, Mice, Hypothermia, Adrenal cortex hormones.

Mice singly housed without bedding at 5C clear carbon from the blood more slowly than animals similarly housed at 25C. Increasing the time of exposure to cold to 2, 18 or 72 hours does not further alter the rate of clearance. Bacteria are also 'cleared' uniformly at the two temperatures when a highly virulent straing (SR-11) of Salmonella typhimurium is injected intravenously, but not when one of low virulence (RIA) is used. The RIA strain disappears from blood more slowly in mice at 5C than in those at 25C. This was demonstrated both by dilution counts and by labeling the bacteria with P32 and following the decline in radioactivity of blood with time. Livers of mice were sampled at times postinfection for radioactivity and for viable bacterial counts. Housing temperature had no effect on radioactivity changes, but viable counts were higher and decreased more slowly in mice at 5C than at 25C. These findings are believed to account, in part, for the greater susceptibility to infection with RIA that was previously seen in mice exposed to cold compared to those at 25C. (Author)

AD-615 011 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Kent State Univ., Ohio.
SOME HISTOCHEMICAL RESPONSES OF GUINEA PIG TISSUES TO COLD,
by Charles G. Wilber. Feb 65, 17p
Contract AF41 609 1973, Proj. 8241, Task 824102
AAL TDR-64-9

Unclassified report

Descriptors: (*Tissues (Biology), Low-temperature research), (*Biochemistry, Histology), (*Exposure, Pathology)Tolerances (Physiology), Histological techniques, Liver, Adrenal glands, Kidneys, Glycogen, Lipids, Cavitation, Adrenal cortex, Biological stains, Guinea pigs.

Guinea pigs weighing approximately 300 gm were kept in a cold room, held at 6C, for two weeks. Various organs were then studied histochemically. Liver glycogen is rapidly used up in cold-exposed guinea pigs. The fate of liver lipids is unknown. Lipids in the cortex of the adrenals appear to decrease, and chromaffin material in the medullary areas of the adrenals disappears. There is cavitation in the cortex and an erosion of medullary areas. There is increased metachromasia in the lower tubular areas of the kidneys, but the functional significance of this is not clear. (Author)

AD-615 012 Div. 16
CFSTI Prices: HC$6.00 MF$1.50

Army Biological Labs., Frederick, Md.
CAUSAL FACTORS IN MICROBIOLOGICAL LABORATORY ACCIDENTS AND INFECTIONS,
by G. Briggs Phillips. Apr 65, 242p
Miscellaneous Publication no. MP-2
Proj. 1C622401A072

Unclassified report

Descriptors: (*Accidents, Biological laboratories), (*Biological laboratories, Accidents), (*Infections, Biological laboratories), Performance (Human), Safety, Hazards, Wounds and injuries, Laboratory equipment, Handling, Laboratory animals, Scientific personnel, Microbiology.

This research was conducted to uncover causal factors of accidential infections and injuries in microbiological laboratories. Less than 20 per cent of the infections were caused by recognized and recorded accidents. As many as 80 per cent of the infections were caused by unsafe acts that occurred without realization or recognition. These are described as 'micro-mistakes' resulting in the release of undetected amounts of pathogens to the workers' environment. More than three-quarters of the injuries were caused by unsafe acts. Unsafe conditions caused 10 per cent of the accidents. Dried cultures, infected eggs, and aerosolized cultures were the most hazardous forms of infectious microorganisms. Younger workers and those with less technical training experienced more accidents than older workers or those with more training. Interviews with accident-involved and accident-free persons provided insight into the role of human factors. Accident-involved persons tended to lack accident perception ability and to be inflexible in their work habits. They also were inclined toward excessive risk taking, working at excessive speeds, and intentional violation of regulations. Accident-free workers were more conservative in evaluating safety and seemed able to develop defensive work habits. (Author)

AD-615 047 Div. 16

Defence Research Medical Labs., Toronto (Ontario).
THE LIPOTROPIC ACTION OF COLD. 1. THE INFLUENCE OF COLD AND CHOLINE DEFICIENCY ON LIVER LIPIDS OF RATS AT DIFFERENT INTAKES OF DIETARY METHIONINE,
by M. W. Radomski and J. D. Wood. 20 Jul 64, 9p Research Paper no. RP-563

Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v42 p769-77 1964 (Copies available only to DDC users).

Descriptors: (*Lipids, Cold weather tests), (*Cholines, Cold weather tests), Liver, Rats, Diet, Methionine, Deficiency diseases, Cholesterol, Phospholipids, Canada.

The effect of cold exposure and choline deficiency on the levels of liver lipids of male albino rats was studied at four dietary intakes of methionine (20-100 mg per rat per day). After exposure of the animals to cold (2-3 degrees C) for a 10-day period, the liver lipids were analyzed for total and free cholesterol, phospholipid, and triglyceride. In choline-fed animals, cold exposure did not affect triglyceride or total cholesterol levels but elevated phospholipid and free cholesterol and decreased ester cholesterol. The increase in phospholipid levels occurred at all methionine intakes with the changes in the cholesterol fractions occurring only at methionine intakes >40 mg per day. In choline-deficient rats, there was evidence that the lipotropic action of cold exposure was related to dietary methionine intake. At methionine intakes <60 mg per rat per day, fatty infiltration of the livers of the choline-deficient cold-exposed rats occurred, as evidenced by the accumulation of triglyceride and ester cholesterol. Concomitantly, phospholipid levels decreased. The data suggest that cold increases the capacity of the animal to synthesize choline from endogenous sources. (Author)

AD-615 048 Div. 16

Defence Research Medical Labs., Toronto (Ontario).
HORMONAL HYPERTENSION RESULTING FROM PITUITARY IMBALANCE,
by John Hunter and R. E. Haist. 1 Oct 64,
10p Research Paper no. RP-578
Proj. D50 93 10 72
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v43 p269-78 1965 (Copies available only to DDC users).

Descriptors: (*Hypertension, Hormones), (*Hormones, Hypertension), (*Pituitary gland, Blood pressure), (*Blood pressure, Pituitary gland), Pituitary hormones, Adrenocorticotropic hormone, Canada.

The removal of the posterior part of the pituitary gland in the rat leads to an elevation in blood pressure. The production of an anterior-posterior pituitary imbalance in hypophysectomized animals by the administration of certain hormones of target glands influenced by the anterior pituitary (thyroxine, testosterone, cortisone (TTC) also produces an increase in mean arterial blood pressure. In the intact animal, too, the administration of the hormones of the target organs (TTC) will lead to an elevation of blood pressure, and 1 week after the cessation of this treatment the blood pressure is as high or higher than at the end of the administration period. Administration of anterior pituitary hormones TSH, LH, and ACTH both in hypophysectomized and in intact rats also produced elevations in blood pressure. It is concluded that an imbalance between the influences of the anterior and posteriorparts of the pituitary gland can lead to a significant elevation in blood pressure.

AD-615 049 Div. 16

Naval Medical Research Inst., Bethesda, Md.
TRANSILLUMINATION AS A MEANS OF STUDYING THE FUNDUS OF SMALL ANIMALS,
by J. E. Goodson, Phyllis E. Stopp, and M. L. Wolbarsht. 1964, 3p
Research rept. no. MR-005.13-1500.06-R-2
Proj. MR005 13 1500 06
Unclassified report

From the Proceedings of the Physiological Society, 17-18 Apr 64. Pub. in Journal of Physiology v172 p41-2 1964 (Copies available only to DDC users).

Descriptors: (*Eye, Illumination), (*Illumination, Eye), Birds, Animals, Pigeons, Retina, Ophthalmology.

Indirect transverse illumination of the retina is recommended for examination and photography of the fundus of birds and other small animals. The light is introduced via the pupil of the opposite eye, and the contralateral retina is illuminated by the light passing through the intervening structures.

AD-615 053 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
STAPHYLOCOCCAL ANTITOXIN VALUES IN THE SERA OF PERMANENT RESIDENTS AND VISITORS IN THAILAND,
by Oscar Felsenfeld and Napha Nasuniya. 1964, 4p
Unclassified report

Pub. in Journal of Tropical Medicine and Hygiene v67 p300-3 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Staphylococcus, Toxins and antitoxins), (*Food poisoning, Toxins and antitoxins), (*Toxins and antitoxins, Staphylococcus), Blood serum, Immunology, Diagnosis, Antigens and antibodies, Thailand.

A sample of adult Thai permanent residents of Thailand had higheranti-alpha toxin and anti-enterotoxin serum levels than newcomers from the United States of America. There were also significantly more persons in the former group whose sera formed several precipitation lines in the Preer test against crude staphylococcal supernates. Staphylococcal food poisoning led to elevated serum anti-alpha and enterotoxin levels. Serum anti-alpha toxin values were increased both in staphylococcal skin lesions and in staphylococcal food poisoning. Serum antienterotoxin levels did not increase significantly in staphylococcal skin infections, cholera, salmonellosis or shigellosis. It is suggested that the anti-alpha toxin titration be employed as an aid in the diagnosis of staphylococcal food poisoning in newcomers to the tropics if other staphylococcal infections can be excluded. 'Tourist diarrhoea' may be due to many agents. Staphylococci are only one of the numerous causes of that disease. (Author)

AD-615 057 Div. 16

University of Western Ontario, London.
THE AMELIORATIVE EFFECTS OF HEPARIN AND DEPOLYMERIZED HYALURONATE ON DECOMPRESSION SICKNESS IN RATS,
by R. B. Philp. 22 May 64, 11p
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v42 p819-29 1964
(Copies available only to DDC users).

Descriptors: (*Decompression sickness, Drugs), (*Mucopolysaccharides, Decompression sickness), (*Heparin, Decompression sickness), (*Anticoagulants, Decompression sickness), Rats, Coumarins, Blood coagulation, Dosage, Lipids, Canada.

The protective effects in decompression sickness of heparin, partially depolymerized hyaluronate (PDHA, a substance reported to have antilipaemic properties), and bishydroxycoumarin were studied by a standardized compression-decompression technique in rats. Bishydroxycoumarin did not afford any significant degree of protection even at dose levels which prolonged the prothrombin time as much as five times normal. Heparin, however, significantly reduced the incidence of 'bends' in rats at a dose which only briefly prolonged the whole-blood clotting time, and significantly reduced both the incidence and the severity at higher dose levels. PDHA produced the most marked reduction in both incidence and severity at dose levels which did not significantly alter the whole-blood clotting time. These protective effects

were absent when heavy, fat rats were used, and when the compounds were administered before the compression (i.e. more than 2 hours before the actual evaluation of signs of the bends). In view of these results it is postulated that anticoagulation per se has little beneficial effect in treating the bends; the protection afforded by these mucopolysaccharides may be related to their lipaemia-clearing activity. (Author)

AD-615 059 Div. 16

University of Western Ontario, London.
COMPARATIVE EFFECTS OF SUCROSE AND CORNSTARCH IN LOW-PROTEIN DIETS FED TO RATS EXPOSED TO COLD,
by J. R. Beaton and J. F. Sangster. 24 Sep 64, 9p
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v43 p241-9 1965
(Copies available only to DDC users).

Descriptors: (*Exposure, Diet), (*Sucrose, Diet), (*Starches, Diet), (*Diet, Exposure), Proteins, Casein, Rats, Cold weather tests, Body weight, Canada.

Young male rats were fed one of three low-protein (5% casein) diets differing in the source of carbohydrate (sucrose, equal parts sucrose and cornstarch, or cornstarch) or a 20% casein (sucrose) diet at environmental temperatures of 24C or 5C. Replacement of sucrose with starch appeared to have a small but significant effect in increasing body weight gain for 15 days (but not the next 28 days) at 24C and also in animals exposed to cold for 28 days after a 15-day feeding period at 24C. In disagreement with results reported by Andik et al., cold exposure, although significantly increasing body weight gain and food intake in rats fed the 5% casein-starch diet, did not elicit a weight gain as great as that observed in 20% casein-fed animals at either 24C or 5C. The 24-hour food intake following a 24-hour fast exceeded the intake on the day before fasting on all diets for animals maintained at 5C but not 24C. The immediate (1/2 hour) and 24-hour food intakes of rats at 5C exceeded those of comparable dietary groups at 24C. At 5C, the 24-hour food intake, following the fast, of rats fed the 5% casein-starch diet exceeded that of the 20% casein-fed controls. (Author)

AD-615 060 Div. 16

University of Western Ontario, London.
INSULIN HYPERPHAGIA IN RATS FED A LOW-PROTEIN DIET,
by J. R. Beaton, V. Feleki, and J. A. F. Stevenson.
6 Oct 64, 9p
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v43 p225-33 1965 (Copies available only to DDC users).

Descriptors: (*Appetite, Insulin), (*Diet, Proteins), (*Rats, Appetite), (*Insulin, Appetite), (*Proteins, Appetite), Casein, Lipids, Body weight, Oxygen consumption, Glucose, Blood, Protamines, Zinc compounds, Canada.

The investigation was undertaken to ascertain if daily treatment with insulin known to increase lipogenesis, fat deposition, and food intake on a normal diet, could overcome or prevent the hypophagia of rats fed a low-protein (5% casein) diet. Male Wistar rats on 20 or 5% casein diets were injected subcutaneously daily for 25 days with 2 units/100 g body weight of protamine zinc insulin (PZI) or saline. PZI increased the food intake and weight gain on both diets but not linear growth. It increased body fat markedly and protein slightly on the low-protein diet and body fat only on the normal diet. In a second similar experiment, in which treatment was continued for 17 days, PZI caused no change in resting oxygen consumption from that of the controls on either diet but did prevent the increase in running activity that rats on a low-protein diet show. In both experiments, although the insulin-treated rats on low-protein diet ate as many calories as the saline-treated controls on the normal diet, they gained significantly less weight. This paradox remains unexplained. The rebound increase in blood sugar following injection of PZI was relatively much faster in the low-protein animals. This was associated with a more immediate and greater food intake suggesting a 'meal-eating' pattern of food intake in these animals which may have also enhanced lipogenesis. (Author)

AD-615 061 Div. 16

University of Western Ontario, London.
THE TEMPERATURE RESPONSE OF THE MALE RAT TO TREADMILL EXERCISE, AND THE EFFECT OF ANTERIOR HYPOTHALAMIC LESIONS,
by G. E. Thompson and J. A. F. Stevenson. 15 Oct 64, 9p
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v43 p279-87 1965
(Copies available only to DDC users).

Descriptors: (*Rats, Exercise), (*Exercise, Rats), (*Thalamus, Rats), Temperature, Canada.

Male rats exercised on a motor-driven treadmill at a speed of 4.6 meters/minute showed an increase in colonic temperature until it reached a level (39.2-39.5C) at which peripheral vasodilatation, as measured by change in skin temperature, occurred in the feet and tail. The colonic temperature then remained at this level above the resting temperature for the duration of exercise. Increasing (6.2 meters/minute) or decreasing (3.2 meters/minute) the speed of exercise resulted in more or less vasodilatation respectively, but did not change appreciably the level at which colonic temperature was regulated during exercise. The colonic temperature at which peripheral vasodilatation first occurred appeared to be a 'critical' temperature, being altered by bilateral lesions in the preoptic and anterior hypothalamic areas of the brain. (Author)

AD-615 074 Div. 16

Denver General Hospital, Colo.
RELIEF OF HEART STRAIN BY MEANS OF AN ARTIFICIAL HEART. COMMUNICATION II. REVERSAL OF ISCHEMIC EKG CHANGES BY MEANS OF POST-SYSTOLIC REINFORCEMENT: AN EXPERIMENTAL STUDY (Herzentlastung durch extrakerporalen Hilfsventrikel. II. Mitteilung. Umkehrung von ischamischen EKG-Veranderungen mittels nachsystolischer (orthophasischer) Verstarkung: Eine experimentelle Studie),
by David H. Watkins, Phillip B. Callaghan, and Erwin J. Klink. 6 Oct 64, 24p
Grant DA MD49 193 63G71
Unclassified report

Text in German.
Pub. in Langenbecks Arch. klin. Chir. v309 p182-205 1965 (Copies available only to DDC users).

Descriptors: (*Mechanical organs, Heart), (*Heart, Mechanical organs), Electrocardiography, Blood vessels, Anemias, Muscles.

AD-615 075 Div. 16

Lund Univ. (Sweden).
CORTICAL CO2 TENSION AND NEURONAL EXCITABILITY,
by K. Krnjevic, Mirjana Randic, and B. K. Siesjo.
23 Jun 64, 18p
Contract N62558 3954
Unclassified report

Pub. in Journal of Physiology v176 p105-22 1965 (Copies available only to DDC users).
Research done in cooperation with the A. R. C. Institute of Animal Physiology, Babraham, Cambridge, England.

Descriptors: (*Carbon dioxide, Cerebral cortex), (*Cerebral cortex, Brain), (*Nerve cells, Excitation), Glutamic acid, Electrophoresis, Pressure, Anesthesia, Electroencephalography, Membranes (Biology), Sweden.

Changes in the excitability of cortical cells were tested by micro-iontophoresis of L-glutamate during hypercapnia, recording simultaneously the cortical PCO2. Many cells clearly reacted to even small changes in PCO2. Moderate doses of CO2 led to both excitation and depression. With relatively low concentrations of inspired CO2 (<10%) the relative importance of excitant and depressant effects varied between cells and between different animals; with strong doses of CO2 (>10%) the depressant action was always predominant. CO2 probably acts directly on the cortex. Cortical responses evoked by peripheral stimulation were also examined; moderate hypercapnia depressed the evoked firing of units, but had relatively little effect on the slow-wave responses. Under chloralose anaesthesia, slow waves were very much potentiated by strong hypercapnia. Membrane potentials of cortical cells showed a consistent tendency towards hyperpolarization during hypercapnia and a sharp depolarization when PCO2 fell again. These changes in resting potential may account for some of the observed variations in excitability. Spinal neurones appear to be less sensitive than cortical neurones to variations in PCO2. (Author)

AD-615 088 Div. 16

Lockheed Missiles and Space Co., Sunnyvale, Calif.
RUSSIAN ANNOUNCED BIO-ASTRONAUTICS TESTS. A SURVEY OF THE LITERATURE,
comp. by A. A. Beltran. 28 Dec 59, 8p
Special bibliography no. SB-59-61
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Space biology, USSR), (*Laboratory animals, Space flight), Reviews, Bibliographies, Dogs, Rabbits, Sounding rockets.

The prime concern of this literature survey (of 14 items) is with the two dogs and a rabbit launched into space and successfully recovered on July 2, 1959, and the dogs launched and recovered on July 10, 1959. In most cases, the full text is presented. (Author)

AD-615 093 Div. 16, 13
CFSTI Prices: HC$2.00 MF$0.50

Chicago Univ., Ill.
THE WARD MANAGER CONCEPT. IS IT FEASIBLE AND DESIRABLE IN A MILITARY HOSPITAL.
Master's thesis,
by Robert R. Riedle. 31 Mar 65, 30p
Unclassified report

Descriptors: (*Hospitals, Military facilities), (*Nurses, Military facilities), Supervisory personnel.

The ward manager concept is regarded as both feasible and desirable in the military hospital. It should help alleviate nursing staffing problems, improve management of the nursing unit, and enhance patient care. It is recommended that a medical administrative supervisor be placed in the position of ward manager on each ward of a military hospital. Should the size and/or activity of a ward not warrant such a position, this person could then be utilized in the capacity of floor manager by overseeing two or more wards as the workload dictates. This person should be assisted by as many medical administrative specialists or apprentice medical administrative specialists (administrative clerks) as needed to accomplish the administrative functions of the nursing units. In determining the proper number, consideration must be given to staffing these units during the day and evening shifts seven days per week. This ward manager position is not intended to replace the head nurse, staff nurse or wardmaster. It is felt that by relieving these people of their administrative responsibilities, additional time could be alloted for nursing.

AD-615 107 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Bryn Mawr Coll., Pa.
ENZYME INDUCTION AND CORTISONE PROTECTION IN ENDOTOXIN-POISONED MICE AT 25C COMPARED WITH THAT AT 5C,
by L. Joe Berry and Dorothy S. Smythe. Jan 65, 20p
Contract AF41 609 1764, Proj. 8241, Task 824101
AAL TDR-64-8
Unclassified report

Descriptors: (*Toxins and antitoxins, Inhibition), (*Corticosteroid agents, Toxins and antitoxins), (*Enzymes, Toxins and antitoxins), Body temperature, Proteins, Biosynthesis, Antibiotics, Guanine, Chloramphenicol, Salmonella, Diseases, Mice, Poisoning.

Mice housed at 25C are protected by cortisone against endotoxin lethality when the hormone is given at the same time as the poison, but not an hour or two later. This is not true of mice housed at 5C. Activity of liver tryptophan pyrrolase is lowered by endotoxin and elevated by cortisone only in animals at normal temperatures. When endotoxin and hormone are given concurrently, normal enzyme activity is maintained, but activity decreases when the hormone injection is given an hour or more after endotoxin. Actinomycin D, ethionine, 2-thiouracil, and 8-azaguanine (inhibitors of protein synthesis) when given in sublethal amount: potentiate endotoxin, prevent cortisone protection against endotoxin, and block the hormonal induction of tryptophan pyrrolase. Chloramphenicol has none of these effects. Mice infected with Salmonella typhimurium have lower than normal tryptophan pyrrolase activity and a smaller induction of enzyme by cortisone 18 hours postinfection than do normal mice or mice 42 hours postinfection. This occurs only at 25C. (Author)

AD-615 135 Div. 16

California Univ., San Francisco. Medical Center.
MULTIPLE MYELOMA WITH TWO PARAPROTEIN PEAKS: AN INSTRUCTIVE CASE,
by J. P. Vaerman, L. B. Johnson, W. Mandy, and H. H. Fudenberg. 28 Aug 64, 9p
Contract Nonr365600; Grant NIH AM08527
Unclassified report

Pub. in Journal of Laboratory and Clinical Medicine v65 n1 p18-25 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Bone marrow, Neoplasms), (*Neoplasms, Diagnosis), (*Gamma globulin, Electrophoresis), Proteins, Blood serum, Diseases, Anemias.

A case of multiple myeloma with two sharp electrophoretic spikes, one with a sedimentation coefficient of 17 Svedberg units, is reported. Although ultracentrifuge data were in keeping with the diagnosis of Waldenstrom macroglobulinemia, the paraproteins were of the gamma-1A- rather than the gamma 1M-globulin class. The importance of immunological analysis in accurately defining the paraproteins in these disease states is emphasized. Ultra-centrifugal data alone appear to be insufficient to differentiate conclusively between multiple myeloma and Waldenstrom macroglobulinemia. (Author)

AD-615 144 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Maryland Univ., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE, VOL. 4, NO. 4,
ed. by George Anastos. 1965, 17p
Contract DA49 193MD2238
TT 65-62173
Unclassified report

Descriptors: (*Bibliographies, Disease vectors), (*Disease vectors, Bibliographies), (*Insects, Bibliographies), Ticks, Mites, Diptera, Siphonaptera, Lice, Spirochaeta, Blattidae, Bacteria, Protozoa, Rickettsia, Parasites, Hemiptera, Virus diseases, Insect control, Insecticides, Diseases, Epidemiology, USSR, Eastern Europe, China.

AD-615 145 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Maryland Univ., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE, VOL. IV, NO. 5,
ed. by George Anastos. 1965, 16p
Contract DA49 193MD2238
TT 65-62174
Unclassified report

Descriptors: (*Bibliographies, Disease vectors), (*Disease vectors, Bibliographies), (*Insects, Bibliographies), Ticks, Mites, Diptera, Siphonaptera, Lice, Spirachaeta, Blattidae, Bacteria, Protozoa, Rickettsia, Parasites, Hemiptera, Virus diseases, Insect control, Insecticides, Diseases, Epidemiology, USSR, Eastern Europe, China.

AD-615 168 Div. 16, 15
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MATHEMATICAL PROBLEMS ARISING IN BIOMEDICAL RESEARCH,
by Richard Ballman. May 65, 12p
Rept. no. P-3128
Unclassified report

Prepared for presentation at the International Conference on Medical Electronics and Biological Engineering (6th) to be held in Tokyo, Japan, August 22-27, 1965.

Descriptors: (*Medical research, Mathematical analysis), Chemotherapy, Respiratory system, Heart, Nervous system, Physiology, Mathematical models, Time-lag theory.

First the author discusses some analytic problems triggered by chemotherapy, then some aspects of the heart-lung complex, next some questions initiated by cardiology, and finally a class of problems stimulated by current research in neurophysiology. References to detailed treatments are given at the end of the paper.

AD-615 174 Div. 16, 20

USAF Radiation Lab., Univ. of Chicago, Ill.
THE EFFECTS OF IONIZING RADIATIONS ON THE BIOCHEMISTRY OF MAMMALIAN TISSUES.
Quarterly progress rept. no. 55.
15 Apr 65, 105p
Contract AF41 609 1693, Proj. 7757, Task 775702
Unclassified report

Available only for reference use at DDC field Services. Copy is not available for public sale.
See also AD-610 947.

Descriptors: (*Radiation effects, Tissues (Biology)), (*Tissues (Biology), Radiation effects), (*Radioprotective agents, Biochemistry), X rays, Enzymes, Thiols, Amines, Rats, Toxicity, Liver, Radiation injuries, Lethal dosage, Whole body irradiation, Organic phosphorus compounds, Gamma-rays, Hemopoietic system, Tolerances (Physiology), Spleen.

Contents: The effects of Ionizing Radiations on the Biochemistry of Mammalian Tissues: (1) Studies on the Toxicity and Mechanism of Action of 2-Mercaptoethylamine, (2) Further Studies on the Inhibitory Effect of X-radiation on the Development of Microsomal Enzymes of the Liver, (3) Further Studies on the Adenosine Triphosphatase Activity of the Hematopoietic Tissues of Rats Exposed to Cobalt-60 Gamma Radiation; Pharmacological and Toxicological Compounds as Protective or Therapeutic Agents Against Radiation Injury in Experimental Animals: (1) Dose-Mortality Relationships for Several Radioprotective Agents, (2) Microscopic Findings in the Spleens of Mice Given Dimethyl Sulfoxide or Other Chemical Radioprotective Agents Prior to Lethal Whole-Body X-ray Exposure, (3) Relationship Between Spleen Oxygen Tension and Radio-protection with p-Aminopropiophenone (PAPP) in Mice; The Influence of Exposure to Low Levels of Gamma and Fast Neutron Irradiation on the Life Span of Animals: (1) Hyperbaric Oxygen Exposure and Radiation Mortality in Animals.

17. Metallurgy

AD-614 637 Div. 17, 26
CFSTI Prices: HC$1.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
INVESTIGATION OF THE FORMABILITY CHARACTERISTICS OF THE POLYPHASE TITANIUM ALLOY Ti-6Al-6V-2Sn-4Zr,
by Arthur M. Ayvazian and Robert M. Colton.
Mar 65, 21p Technical rept. no. AMRA-TR-65-05
Proj. 1H0 24401A111, Task 36505 Unclassified report

Descriptors: (*Titanium alloys, Material forming), (*Material forming, Titanium alloys), Extrusion, Forging, Aluminum alloys, Vanadium alloys, Tin alloys, Zirconium alloys, Mechanical properties, Temperature, Deformation, Heat treatment, Tensile properties, Ductility, Toughness, Microstructure.

Studies were conducted on a 1000-pound ingot of titanium alloy Ti-6Al-6V-2Sn-4Zr, in order to determine the metal working characteristics. Five actual titanium components were formed from this material by extrusion and press forming. The results from these tests indicated that the ease of formability compared favorably with that of the commercial alloy Ti-6Al-6V-2Sn. The mechanical properties of test specimens taken from parts formed from both alloys disclosed that for the alloy Ti-6Al-6V-2Sn-4Zr the tensile strength was substantially higher and ductility and toughness were lower at the same yield strengths. (Author)

AD-614 707 Div. 17
CFSTI Prices: HC$2.00 MF$0.50

Defense Metals Information Center, Columbus, Ohio.
OXIDATION OF NICKEL-AND COBALT-BASE SUPERALLOYS,
by C. H. Lund and H. J. Wagner. 1 Mar 65, 37p
Rept. no. DMIC-214
Contract AF33 615 1121, Proj. 8975
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Nickel alloys, Oxidation), (*Cobalt alloys, Oxidation), Chromium alloys, High-temperature research, Iron alloys, Molybenum alloys, Titanium alloys, Aluminum alloys, Tungsten alloys, Stresses, Microstructure, Reaction kinetics.

This report presents information dealing with the oxidation of nickel- and cobalt-base superalloys. All of the superalloys will oxidize at high temperatures when oxygen is present in the enveloping atmosphere. The rate of oxidation depends upon alloy composition, temperature, oxygen concentration, oxides formed, diffusion rates of the metals in both base metal and oxide, diffusion rate of oxygen in the oxide, solubility of oxygen in the matrix, and a host of other variables. The effects of oxidation can be beneficial or they can be harmful. The first section of this report deals with the fundamentals of the oxidation of Ni-Cr and Co-Cr alloys. Subsequent sections discuss general surface oxidation, intergranular oxidation, other subsurface oxidation, and the effect of stress on the rate of oxidation. Numerous specific alloys are mentioned in the report; as an aid to the reader, the appendix contains an alloy index of the alloys mentioned in the report along with the compositions of the alloys, and the pages on which mention of the alloys is made. (Author)

AD-614 722 Div. 17, 25

Air Force Cambridge Research Labs., Bedford, Mass.
SOLUTION AND THEORETICAL EVALUATION OF STEADY-STATE EQUATIONS IN CONTINUOUS ZONE REFINING.
Physical Sciences Research Papers,
by John K. Kennedy and N. Grier Parke.
28 Oct 63, 12p Paper no. PSRP-88, AFCRL 65-217
Proj. 5620, Task 562004
Unclassified report

Research done in cooperation with Parke Mathematical Labs., Inc., Carlisle, Mass., and Wolf Research and Development Corp., West Concord Mass., under Contract AF19 628 411.
Pub. in Journal of Applied Physics v35 n7 p2248-53 Jul 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Zone melting, Equations of state), (*Equation of state, Zone melting), Transport properties, Boundary value problems, Density, Theory, Graphics.

The classical theory of continuous zone refining is reexamined in light of alternate boundary conditions taking special care to account systematically for density changes due to melting. The new boundary conditions are applied to the zone-void and matter transport systems. Nondimensional parameters are introduced, leading to universal relations that have made it feasible to use an IBM 7090 computer to compute curves for a set of universal charts. These charts make it possible to explore for and choose rapidly optimum parameters for the design of continuous zone refiners for new materials and to evaluate existing proposals. (Author)

AD-614 903 Div. 17, 14, 30
CFSTI Prices: HC$3.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
EXAMPLES OF CORROSION OF MATERIALS EXPOSED ON STU II-1 IN THE DEEP OCEAN (2340 FEET OF DEPTH FOR 197 DAYS),
by Fred M. Reinhart. 26 Feb 65, 52p
Technical note N-695
Proj. Y F015 01 01 001c
Unclassified report

Descriptors: (*Materials, Underwater equipment), (*Corrosion, Sea water), (*Liquid immersion tests, Sea water), (*Underwater equipment, Corrosion), Ocean bottom, Degradation, Aluminum alloys, Copper alloys, Nickel alloys, Steel, Stainless steel, Pacific Ocean, Titanium alloys, Plastics, Cladding, Fibers, Elastomers, Stresses, Marine borers, Cordage, Glass, Laminates, Wood, Coatings.

Preliminary results of corrosion of materials, based solely upon visual examinations, exposed in 2340 feet of water in the Pacific Ocean for 197 days showed only a few cases of deterioration different from those usually found in moving surface sea water. The Clad layers on two aluminum alloys corroded at a much faster rate than normal for surface sea water. The lace-work and undersurface types of attack on certain stainless steels appear to be similar to types of attack by stagnant surface sea water; this could be attributed to low oxygen content as well as lack of a significant movement of deep sea water. Other materials, both metallic and nonmetallic, were not seriously deteriorated and some showed absolutely no evidence of deterioration. In order to obtain meaningful results, considerable critical examination of the various specimens will be required. (Author)

AD-615 022 Div. 17

Frankford Arsenal, Philadelphia, Pa.
FRACTURE TOUGHNESS AND PRESSURE VESSEL PERFORMANCE,
by Carl M. Carman, Domenic F. Armiento, and Harold Markus. 15 Aug 63, 12p Rept. no. A63-24
Proj. 1H024401A111 Unclassified report

Rept. prepared for presentation at the Winter Annual Meeting of the American Society of Mechanical Engineering, Philadelphia, Pa., 17-22 Nov 63.
ASME Paper no. 63-WA-138
Pub. in Journal of Basic Engineering p1-7 1963
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pressure vessels, Fracture (Mechanics)), (*Fracture (Mechanics), Pressure vessels), Metallography, Iron alloys, Toughness, Fatigue (Mechanics), Failure (Mechanics), Stresses, Strain (Mechanics), Fractography.

Criteria for predicting pressure vessel performance based on fracture toughness are reviewed in general terms. Experimental studies of small pressure vessels fabricated of high toughness, high strength steel 4330V (Mod + Si) are described. Data presented include fatigue life in presence of a small part-through-crack and burst properties of the fatigue cracked cylinders. Interpretation of the fatigue data is based on Paris' relationship $da/dN = K$ to 4th power/M. The failure stresses are discussed in relation to the stress elevating effect of local bulging on the apparent fracture toughness. The behavior observed in testing full scale high strength pressure vessels fabricated from materials having intermediate fracture toughness, namely, D6A steel at 200,000-psi yield strength and 300M steel at 230,000-psi yield strength and materials having limited fracture toughness, namely, twenty percent nickel maraging steel at 280,000-psi yield strength, are discussed in relation to the ratio of fracture toughness to plane-strain fracture toughness based on the part-through-crack model. Precautions necessary for fabrication and inspection to insure reliable performance are discussed. (Author)

AD-615 024 Div. 17, 26
CFSTI Prices: HC$1.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
THE EFFECT OF DEFORMATION AND HEAT TREATMENT ON THE MECHANICAL PROPERTIES OF THE Ti-6Al-6V-2Sn-4Zr-1Fe-1Cu ALLOY,
by Perry R. Smoot. Mar 65, 20p AMRA TR-65-04
Proj. 1C024401A110 Unclassified report

Descriptors: (*Titanium alloys, Mechanical properties), (*Deformation, Titanium alloys), (*Heat treatment, Titanium alloys), Aluminum alloys, Vanadium alloys, Tin alloys, Zirconium alloys, Iron alloys, Copper alloys, Forging, Aging (Materials), Tensile properties, Ductility, Shock resistance.

The effect of deformation and heat treatment variables on the mechanical properties of a promising experimental alloy, Ti-6Al-6V-2Sn-4Zr-1Fe-1Cu, was determined utilizing material from a commercially procured ingot. Forging, solution, and aging temperatures and aging times were varied and the resultant notched and unnotched tensile and impact properties were obtained to establish the highest yield strength obtainable in combination with adequate ductility, as defined by Specification MIL-T-46038. This optimum combination of properties was obtained at a yield strength level of 200 ksi, with an elongation of 9 percent, a reduction of area of 26 percent, and Charpy V-notch impact energy of 6 foot-pounds at -40 F. (Author)

AD-615 027 Div. 17, 25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SYSTEMATISM OF BINARY INTERMETALLIC PHASES,
by P. I. Kripyakevich and E. E. Cherkashin.
9 Apr 65, 90p FTD-TT-63-1018
TT 65-62159
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR, Sektor Fiziko-khimicheskogo Analiza. Izvestiya v24 p59-123 1954.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Intermetallic compounds, Phase studies), (*Phase studies, Intermetallic compounds), Tables, Indexes, Crystal structures, Metals.

AD-615 029 Div. 17, 14
CFSTI Prices: HC$3.00 MF$0.75

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
by Carolyn A. Green. Apr 65, 62p
Unclassified report

Descriptors: (*Materials, Bibliographies), (*Bibliographies, Materials), (*Metallurgy, Bibliographies), (*Abstracting, Metallurgy), Alloys, Nickel alloys, Steel, Stainless steel, Iron alloys, Beryllium, Titanium, Aluminum, Carbon, Graphite, Refractory metals, Ceramic materials, Oxides, Tantalum alloys, Tungsten, Material forming, Physical properties, Mechanical properties, Coatings, Composite materials, Indexes, Materials, Magnesium, Niobium, Vanadium, Metals.

Contents: High-strength alloys, light metals, nonmetallics, refractory metals, and miscellaneous materials.

AD-615 070 Div. 17

Sheffield Univ. (England).
THE MAGNETIC SUSCEPTIBILITY OF THE GADOLINIUM, LUTETIUM ALLOY SYSTEM,
by J. Popplewell, A. M. Harris, and R. S. Tebble.
13 Aug 64, 4p
Grant AF EOAR62 54
AFOSR 65-0741
Unclassified report

Pub. in Proceedings of the Physical Society v85 p347-9 1965 (Copies available only to DDC users).

Descriptors: (*Gadolinium alloys, Magnetic properties), (*Lutetium alloys, Magnetic properties), Great Britain, Transition temperature, Magnetic moments, Magnetism.

The magnetic susceptibility has been measured for alloys containing 90.2 %, 80.6 %, 69.4 %, 57.2 %, 47.6 %, 34.6 %, 20.2 %, 15 % and 8.3 % gadolinium in lutetium. These measurements have enabled the Curie temperature and magnetic moment of the alloys to be determined. Only the 20.2 % Gd alloy shows any departure from the Curie-Weiss behaviour and this is attributed to the onset of antiferromagnetic ordering. (Author)

18. Military Sciences and Operations

AD-614 623 Div. 18, 26
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
THEORY OF THE MAINTENANCE OF COMPLEX EQUIPMENT.
Condensed form of report,
by Erich Pieruschka. 21 Nov 58, 33p
Rept. no. LMSD-450626
Unclassified report

Descriptors: (*Maintenance, Theory), (*Logistics, Maintenance), Theory, Statistical functions, Probability, Reliability, Air force equipment, Army equipment, Naval equipment, Functional analysis.

With increasing complexity of equipment, reliability has become a serious problem. The paper presents the problems of improving reliability through maintenance. The mathematical aspects of maintenance is discussed with emphasis on practical usage.

AD-614 895 Div. 18, 20
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE CHINESE NUCLEAR EXPLOSION, N-NATION NUCLEAR DEVELOPMENT AND CIVIL DEFENSE,
by E. R. Zilbert. Apr 65, 26p Rept. no. P-3074
Unclassified report

Descriptors: (*Nuclear explosions, China), (*China, Nuclear explosions), (*United States, Civil defense systems), (*Civil defense systems, United States), Radioactive fallout, Nuclear warfare, History, Shelters, India, Brazil, Cuba.

The October 1964 explosion of an atomic device by China is reviewed, with thought as to possible similar activities by other countries such as India and Brazil. The United States Government is taken to task for having implemented no fallout shelter program.

AD-614 979 Div. 18, 13
CFSTI Prices: HC$4.00 MF$1.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
DEVELOPMENTS IN PROTECTIVE SHELTER SYSTEMS.
Rept. for Jul 62-May 64,
by P. J. Rush. Apr 65, 124p Technical rept. no. R-357
Proj. Y F011 05 02 303
Unclassified report

Descriptors: (*Shelters, Design), (*Civil defense systems, Shelters), Blast, Nuclear explosions, Drag, Shock (Mechanics), Cratering, Thermal radiation, Biological warfare agents, Chemical warfare agents, Underground structures, Specifications, Soils, Construction, Operation, Materials, Electromagnetic pulses, Costs, Air, Temperature control, Humidity, Water supplies, Food, Medical supplies, Sanitary engineering, Illumination, Power supplies, Communication systems.

Topics include: bibliography of nuclear weapons effects, the protective structure, confining soils, entranceways and exits, blast exclusion methods, shock isolation, nuclear and thermal radiation resistance, electromagnetic pulse resistance, resistance to chemical and bacteriological attack, shelter costs, space and furnishing requirements, air supply, temperature and humidity control, water and food supplies, medical supplies, sanitary facilities, illumination, electric power supply, communications.

AD-615 003 Div. 18, 28, 29, 30
CFSTI Prices: HC$4.00 MF$1.00

Georgia Univ., Athens.
SHELTER OCCUPANCY STUDIES AT THE UNIVERSITY OF GEORGIA.
Appendices.
31 Dec 64, 149p
Contract OCD PS64 77, Task 1521A Unclassified report

See also AD-615 004.

Descriptors: (*Radioactive fallout, Shelters), (*Shelters, Scientific research), (*Management engineering, Shelters), Civil defense systems, Personnel management, Personnel, Performance (Human), Confined environments, Stress (Psychology), Stress (Physiology), Personality, Leadership, Sanitary engineering, Phenols, Sleep, Temperature, Food, Water, Physical fitness, Ventilation, Logistics, Environmental tests.

From 8-21 February, 1964, a 13-day simulated fallout shelter occupancy test was conducted by the University of Georgia Psychological Laboratories. This test was the fifth in a series of such studies. Its primary purpose was the evaluation of shelter survival without a trained shelter manager. Other purposes included relative food preference tests, commode chemical tests, and cognitive vigilance tests. Thirty shelterees, 15 males, 15 females, aged 7-70, participated. Stress conditions included restricted food and water rations, minimal living space (8 sq. ft./person), a chemical commode, reduced ventilation, and sleeping accommodations of corrugated fiberboard placed over a concrete floor. The shelter manager was appointed, although he received no prior training in management methods or familiarization with shelter material. A Shelter Manager Handbook, with additional instructional material, was stocked with the OCD shelter supplies. The handbook provided information on use of stocked items, as well as a suggested daily activity and training program.

AD-615 004 Div. 18, 28, 29, 30
CFSTI Prices: HC$4.00 MF$1.00

Georgia Univ., Athens.
SHELTER OCCUPANCY STUDIES AT THE UNIVERSITY OF GEORGIA.
Final rept.,
by John A. Hammes. 31 Dec 64, 123p
Contract OCD PS64 77, Task 1521A Unclassified report

Descriptors: (*Radioactive fallout, Shelters), (*Shelters, Scientific research), (*Management engineering, Shelters), Civil defense systems, Personnel management, Personnel, Performance (Human), Confined environments, Psychomotor tests, Personality, Leadership, Sanitary engineering, Sleep, Temperature, Food, Water, Physical fitness, Noise, Ventilation, Lighting equipment, Logistics, Stress (Psychology), Stress (Physiology).

From 1962-1964 the University of Georgia conducted six simulated community fallout shelter occupancy tests for the Office of Civil Defense. Investigated variables included organizational and environmental factors. Men, women, and children, aged 3-70 years, participated. Recent test results and overall implications for the National Shelter Program are presented in this report. (Author)

AD-615 005 Div. 18, 28, 29, 30
CFSTI Prices: HC$1.00 MF$0.50

Georgia Univ., Athens.
SHELTER OCCUPANCY STUDIES AT THE UNIVERSITY OF GEORGIA.
Final summary rept.,
by John A. Hammes. 31 Dec 64, 20p
Contract OCD PS64 77, Task 1521A Unclassified report

See also AD-615 004.

Descriptors: (*Radioactive fallout, Shelters), (*Shelters, Scientific research), (*Management engineering, Shelters), Civil defense systems, Personnel management, Personnel, Performance (Human), Confined environments, Stress (Psychology), Stress (Physiology), Personality, Leadership, Sanitary engineering, Phenols, Sleep, Temperature, Food, Water, Physical fitness, Ventilation, Logistics, Environmental tests.

AD-615 052 Div. 18

Advanced Research Projects Agency, San Francisco, Calif. 96346. Research and Development Field Unit.
POPULATION CONTROL TECHNIQUES OF COMMUNIST INSURGENTS; A SOCIOLOGICAL ANALYSIS,
by Franklin Mark Osanka. 1964, 6p Unclassified report

Pub. in Australian Army Journal n176 p11-8 Jan 1964
(Copies available only to DDC users).

Descriptors: (*Communists, Guerilla warfare), (*Guerilla warfare, Communists), (*Counterinsurgency, Communists), Sociology, Psychological warfare, Propaganda, Control, China, Analysis.

The purpose is to examine control measures employed at the village level by Communist insurgents to insure the loyalty of the population of a village during the pre-violence stage and early stage of guerilla action in an insurgency. The insurgent organizers have, as a mission, to establish an effective underground apparatus. Their method of area penetration follows 3 phases: identification, propagation, and organization. The successful completion of these phases at the village level results in 4 principal conditions of control: in-group loyalty, insurgent terror tactics, personal commitment, and government terror tactics. The author contends that a people that has been won over by insurgents are best won back by counter-insurgents who demonstrate by attitude and action their desire and ability to eliminate the basic social ills and legitimate personal grievances, and who protest the people from the insurgents. The author also contends that Chinese-Communist-style insurgency is the archtype for most underdeveloped areas in the world and that insurgency is the principal export item of Red China.

19. Navigation

AD-614 675 Div. 19, 12
CFSTI Prices: HC$3.00 MF$0.75

Massachusetts Inst. of Tech., Cambridge.
ANALYSIS OF AN INTERPLANETARY LINE-OF-SIGHT GUIDANCE TECHNIQUE.
Master's thesis,
by John Charles Ruth. Feb 65, 93p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Midcourse guidance, Interplanetary trajectories), (*Interplanetary trajectories, Midcourse guidance), (*Astronautics, Midcourse guidance), Space navigations, Mars probes, Venus probes, Numerical methods and procedures, Manned spacecraft.

A simplified guidance scheme using the line-of-sight to the target as the controlling parameter is investigated. Deviations of the line-of-sight from a precomputed reference form the basis of the technique. Two Mars trajectories and one Venus trajectory are perturbed due to injection errors from their reference trajectories. The astronaut is capable of manually computing the corrections with elementary mathematics, the use of reference tables and a slide rule. This technique can serve as a back up guidance scheme in case of an onboard computer failure. With the simplicity of this scheme, miss distances of 1,200,000 kilometers were reduced to 300 kilometers at a cost of less than 400 meters per second. In a number of cases accuracies within 30 kilometers were achieved.

AD-614 841 Div. 19, 8
CFSTI Prices: HC$3.00 MF$0.75

Maxson Electronics Corp., Great River, N. Y.
25 KW TACAN TRANSMITTER ASSEMBLY.
Final rept.,
by Arnold Rosen. Feb 65, 53p
Contract ARDS630, Proj. 115 47D
SRDS RD-64-151
Unclassified report

Descriptors: (*Radio navigation, Radio transmitters), (*Radio transmitters, Radio navigation), (*Air traffic control systems, Radio navigation), Radio beacons, Ground support equipment, Tetrodes, Radiofrequency amplifiers, Feedback, Circuits, Wiring diagrams.

TACAN is an aircraft-to-ground beacon navigation system which provides to aircraft, over large areas, the azimuth angle and the range of the aircraft to the ground beacon. This report describes the work that was accomplished towards the development of a 25-kilowatt peak power TACAN transmitter ground beacon using negative grid tubes. A technique for obtaining a desired output spectrum from an RF amplifier by making an envelope comparison with a stable reference was postulated. The use of this technique would allow a TACAN Transmitter to be constructed without the spectrum control filter that is currently used. This program has shown it is possible to control a transmitter spectrum by the use of this feedback technique. The test results obtained at 22 kw were sideband ratios of 48 to 49 db. Subsequent to the suspension of this program additional tests were performed at a 13-kw level. The amplifier was constructed of a chain of ceramic coaxial tetrodes. The tubes are capable of delivering the desired output power of 25 kilowatts. Operating with low, fixed plate and screen voltages results in a very small pulse modulator and a reduction in d-c power requirements. A broadband frequency multiplier was developed which simplifies tuning procedures in changing the transmitter from one operating channel to another.

AD-615 172 Div. 19, 6, 31
CFSTI Prices: HC$2.00 MF$0.50

Southwest Research Inst., San Antonio, Tex.
SHIPBOARD SITING OF DIRECTION FINDERS FOR THE 3 TO 30 MC RANGE.
Interim development rept. for 1 Dec 64-28 Feb 65,
by W. M. Sherrill and D. N. Travers. 2 Apr 65, 31p
Task summary rept. no. SR-19
Contract Nobsr89167, Proj. SF0010801, Task 9258
Unclassified report

See also AD-610 000.

Descriptors: (*Direction finding, Radio equipment), (*Ship antennas, Direction finding), High frequency, Shipborne, Loop antennas, Site selection, Performance (Engineering), Ship structural components, Electromagnetic waves, Errors, Azimuth.

The report summarizes the practical requirements for siting radio direction finders operating in the 3 to 30 mc range and is intended primarily for the use of personnel responsible for site selection and DF antenna installation on Naval ships. The effects of reradiation from the ship's superstructure on direction finder performance are described. By the use of specific examples of shipboard installations, the merits of various siting compromises are discussed. (Author)

20. Nuclear Physics and Nuclear Chemistry

AD-614 591 Div. 20
CFSTI Prices: HC$2.00 MF$0.50

Pennsylvania State Univ., University Park.
Dept. of Engineering Mechanics.
CASCADE ARRANGEMENT IN SPHERICAL PRESSURE VESSEL DESIGN FOR NUCLEAR POWER REACTORS,
by L. W. Hu and J. C. Schutzler. Jan 65, 29p
Grant AF AFOSR127 64
AFOSR 65-0315

Unclassified report

Descriptors: (*Pressure vessels, Cascade structures), (*Pressurized water reactors, Pressure vessels), Stresses, Spheres, Reactor coolants, Numerical analysis.

A cascade arrangement of pressure vessels is suggested for nuclear power reactor design. The stress analysis and a procedure for the minimum weight design of cascade spherical shells are presented. A numerical example of two stage spherical shells is given to demonstrate the procedures developed as well as the need of such pressure vessels in nuclear power reactor design. (Author)

AD-614 740 Div. 20

Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
THE BINDING ENERGY DIFFERENCE BETWEEN THE HYPERNUCLIDES 4He sub lambda AND 4H sub lambda. Doctoral thesis,
by M. Raymund. 3 Oct 63, 33p
Grant AF AFOSR62 358
AFOSR 65-0472

Unclassified report

Pub. in Nuovo Cimento v32 (ser. 10) p555-87 May 1 1964 (Copies available only to DDC users).

Descriptors: (*Nuclear binding energy, Hyperons), (*Helium, Nuclear binding energy), (*Hydrogen, Nuclear binding energy), Decay schemes, Pions, Sigma hyperons.

Experimental and theoretical studies indicate a departure from charge symmetry for the mirror hypernuclides 4He sub lambda and 4He sub lambda amounting to a few tenths of a MeV in the binding energies. A nuclear emulsion experiment utilizing 45 newly measured pion(-) mesic decays of 4He sub lambda and 4H sub lambda is reported to give delta B sub lambda = B sub lambda (4He sub lambda) -- B sub lambda (4H sub lambda) = (0.55±0.26) MeV. Contamination by other hypernuclides (probably 5He sub lambda) was eliminated from the 4He sub lambda sample by a strict recoil-range requirement (R> or = 10 micro. m), while, on the other hand, no contaminants were found among the 4H sub lambda decays. The binding energy discrepancy between the pion-r and pion-pr decays of 4H sub lambda was found to be due to pion range measurement losses which are important mainly for the pion-r events (R sub pi = 4 cm). The final value of delta B sub lambda for the latter sample is (0.30±0.14) MeV. Because a negative term in the theoretical calculation of delta B sub lambda is expected from a Coulomb energy increase in the 3He core of 4He sub lambda, this positive experimental result is a strong indication of charge-symmetry violation in the lambda hyperon N interaction compatible with estimates of the virtual electromagnetic effects in (lambda hyperon to lambda hyperon + pion) suggested by theoretical workers.

AD-614 769 Div. 20
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF THE CRITICAL HEAT FLUX FOR TUBULAR FUEL ELEMENTS OF AN ATOMIC POWER PLANT,
by V. A. Zenkevich, O. L. Peskov, and V. I. Subbotin.
7 Apr 65, 10p FTD-TT-65-295
TT 65-62089

Unclassified report

Unedited rough draft trans. of Teploenergetika (USSR) v11 n6 p20-2 1964. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Heat transfer, Boiling water reactors), (*Boiling water reactors, Heat transfer), Reactor fuel elements, Boiler tubes, Water, Steam, Fluid flow, Phase studies, Boiling, Nuclear reactors, Nuclear power plants, High pressure research, USSR.

The results of investigating the boiling crisis during the flow of subcooled water and a steam-water mixture in tubes are given. The validity of using data obtained on tubes for calculating the critical heat flux in the tubular fuel elements of nuclear reactors is substantiated. (Author)

AD-614 843 Div. 20, 15

Philipps-Universitat, Marburg (West Germany). Inst. fur Theoretische Physik.
APPROACH TO ELECTRON-PION SCATTERING,
by H. D. Doebner and D. Simon. 1964, 25p
Contract AF61 052 658
AFOSR 65-0649

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Electrons, Nuclear scattering), (*Pions, Nuclear scattering), (*Nuclear scattering, Elementary particles), Nucleons, Photons, Leptons, Perturbation theory, Quantum mechanics, Field theory, Inelastic scattering, S-matrix, Integrals, West Germany.

It is shown that a usual MANDELSTAM representation completed with a suitable choice for pole terms and single dispersion integrals, obtained straightforwardly from unitarity using quantum electrodynamics and the resonance structure of the pion, provides a method to discuss electron-pion scattering on the same lines as strong interaction theory. The double spectral functions are constructed from a system of integral equations in a strip approximation, and corrections to the one-photon exchange amplitude are expressed by integrals over the imaginary part of the form factor in the annihilation channel.

AD-614 845 Div. 20, 15

Philipps-Universitat, Marburg (West Germany). Inst. fur Theoretische Physik.
ONE-PARTICLE SINGULARITIES AND SU(3),
by H. D. Doebner and G. C. Hegerfeldt. 1964, 5p
Contract AF61 052 658
AFOSR 65-0648

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Nuclear particles, Field theory), (*Field theory, Transformations (Mathematics)), Operators (Mathematics), S-matrix, Mesons, Baryons, West Germany.

The equivalence of two methods of deriving relationships between coupling constants is shown. In an SU(3) - invariant Lagrangian field theory, it is easy to derive relations between coupling constants which enter as numerical coefficients of certain field operator products. In an alternative way, based on the asymptotic formulation of field theory, it is possible to define product of coupling constants in terms of residues in the amplitude, A(s, t), corresponding to known one-particle singularities.

AD-614 849 Div. 20

Philipps-Universitat, Marburg (West Germany). Inst. fur Theoretische Physik.
REMARKS ON OMEGA-PHI AND OCTET-OCTET MIXING,
by H. D. Doebner and G. C. Hegerfeldt. 15 Jun 64, 5p
Contract AF61 058 658
AFOSR 65-0647
Unclassified report

Pub. in Il Nuovo Cimento Series 10 v33 p1724-7 Sep 16 1964 (Copies available only to DDC users).

Descriptors: (*Mesons, Decay schemes), (*Decay schemes, Mesons), Nuclear spins, Nuclear resonance, Nuclear models, Nuclear properties, K mesons, West Germany, Perturbation theory.

AD-614 857 Div. 20

Stanford Univ., Calif.
INELASTIC NEUTRON SCATTERING NEAR THRESHOLD,
by A. B. Tucker, J. T. Wells, and W. E. Meyerhof.
19 Oct 64, 7p
Contracts Nonr22519, Nonr22575
Unclassified report

Pub. in Physical Review (U. S.) v137 n5B pB1181-7 Mar 8 1965(Copies not available to DDC or Clearinghouse customers)
Preliminary report presented at the International Congress of Nuclear Physics, Paris, July 1964.

Descriptors: (*Neutron scattering, Inelastic scattering), (*Inelastic scattering, Neutron cross sections), (*Excitation, Nuclear energy levels), Decay schemes, Parity, Nuclear spins, Iron, Copper, Zirconium, Barium, Cerium, Neutron beams, Gamma emission.

Cross sections for the production of excited states by neutron inelastic scattering were measured as a function of bombarding energy from 0 to 300 keV above threshold for the first two excited states of Fe56, the first two excited states of Cu63, the first excited state of Zr90, the first two excited states of Ba138, and the first three excited states of Ce140. Neutron-beam energy resolution was 10-20 keV. Inelastic-scattering events were counted by detecting gamma rays from the excited states. When the number of open channels for compound-nucleus decay is small, (a condition which exists near threshold for exciting low-lying states) fluctuations of reaction widths about their average values reduce the inelastic-scattering cross section from that predicted by the Hauser-Feshbach equation by as much as 50%. This correction was evaluated, assuming a Porter-Thomas distribution of widths. Good agreement was found between experimental cross sections and the modified Hauser-Feshbach equation in all but two cases. (Author)

AD-614 858 Div. 20

Yale Univ., New Haven, Conn.
LIMITED APPLICABILITY OF NUCLEON TUNNELING THEORY,
by G. Breit. 1964, 3p
Grant DA ARO D31 124G607, Proj. 200 050B700
AROD 893:95
Unclassified report

Pub. in Comptes Rendus du Congres International de Physique Nucleaire, v2, Communications Paris, 2-8 July 1964 (Copies available only to DDC users).

Descriptors: (*Nucleons, Potential theory), (*Nuclear reactions, Neutrons), Quantum mechanics, Nuclear forces, Nitrogen, Isotopes.

AD-614 873 Div. 20, 15, 25

Colorado Univ., Boulder.
DYNAMICAL SYMMETRY GROUP BASED ON DIRAC EQUATION AND ITS GENERALIZATION TO ELEMENTARY PARTICLES,
by A. O. Barut. 30 Jan 64, 6p
Grant AF AFOSR30 63, Proj. 9751, Task 975103
AFOSR 65-0475
Unclassified report

Pub. in Physical Review v135 n3B pB839-42 Aug 10 1964. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Elementary particles, Relativity theory), (*Relativity theory, Elementary particles), (*Groups (Mathematics), Field theory), Nuclear spins, Mass spectrum, Nuclear particles, Electrons, Baryons, Quantum mechanics, Matrix algebra, Operators (Mathematics).

The dynamical or exact symmetry group of the non-relativistic Kepler problem (a symmetry group in four dimensions) is generalized to the Dirac equation and further to elementary particles. The former is a ten-parameter group of rank two isomorphic to a group in five dimensions, the latter a 16-parameter group of rank four isomorphic to a group in six dimensions. Both groups contain the real Lorentz group and couple the space-time quantum numbers with the internal quantum numbers. The 16-parameter group has a 15-parameter simple subgroup and contains two three-dimensional rotation groups, one for ordinary spin and one for isotopic spin. The concept of 'inhomogeneous dynamical group' is introduced. The inhomogeneous group contains two new additive quantum numbers to describe the hypercharge and the baryon number and leads to a mass spectrum. The third component of isospin and the new additive quantum number commute with all the six generators of the Lorentz group. A further generalization leads to a group where all three isospin generators commute with the Lorentz group. (Author)

AD-614 889 Div. 20

Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
INNER BREMSSTRAHLUNG IN MUON DECAY,
by Charles A. Rey. 16 Mar 64, 10p
Unclassified report

Pub. in The Physical Review v135 n5B pB1215-24 Sep 7 1964.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Bremsstrahlung, Muons), (*Muons, Decay schemes), (*Gamma emission, Muons), Beta decay, Probability, Meson reactions, Electrons, Neutrinos, Antiparticles, Scintillation counters, Gamma counters.

A measurement of inner bremsstrahlung in muon decay was made using spark chambers, scintillators and fast oscilloscopes. The electron range distribution in graphite and the absolute rates were determined for electron-gamma-ray angles between 130 and 180 deg. For the electron and gamma-ray energies studied, the branching ratio of muon decays to e+photon+neutrino+antineutrino to muon decays to e+neutrino+antineutrino is predicted to be about 0.0001 over this angular range. The total number of inner bremsstrahlung events observed was 1805±43, which is in agreement with an expected number of 1889±283. The data were found to be in accord with the predictions given by electromagnetic corrections applied to the weak interaction. (Author)

AD-614 890 Div. 20

Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
SEARCH FOR THE DECAY MUON(+) TO e(+)+GAMMA,
by Sherwood Parker, Herbert L. Anderson, and Charles Rey. 26 Aug 63, 11p
Unclassified report

Pub. in The Physical Review v133 n3B pB768-78 Feb 10 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Muons, Decay schemes), (*Decay schemes, Beta decay), (*Gamma emission, Muons), Positrons, Electrons, Pions, Probability, Scintillation counters.

A search has been conducted for the decay of muon(+) into e(+)+gamma using spark chambers, scintillators, and fast oscilloscopes. The number of stopped pions, 7.39X10 to the ninth power and the detection efficiency of the apparatus for muon to electron + gamma events, 3.9%, would predict the detection of 3 events for a branching ratio of 10 to the minus eighth power. No evidence for the existence of this decay was found. The distribution in range of the e(+) in graphite, and of the (e, to the minus eighth power) angle for the events found near 180 deg was consistent with that expected from muon(+) to position +neutrinotantineotrino+gamma. The probability of finding the observed distribution was calculated to be greatest for an assumed muon to electron+gamma branching ratio of zero. This probability drops below 50% of this value if the branching ratio is 0.6X10 to the minus eighth power, and below 10% for 2.2X10 to the minus eighth power. (Author)

AD-614 899 Div. 20, 17
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS.
Rept. for 1 Nov 64-31 Jan 65,
by L. E. Steele, J. R. Hawthorne, C. Z. Serpan, Jr., E. P. Klier, and H. E. Watson. 15 Feb 65, 25p
NRL MR-1593
Contract AF49 5 2110, Projs. RR007 01 5409, SR007 01 01, Task 0858
See also AD-609 272.
Unclassified report

Descriptors: (*Reactor materials, Steel), (*Steel, Radiation damage), (*Radiation damage, Reactor materials), Metal plates, Heat treatment, Pressure vessels, Structural parts, Environmental tests, Ductility, Microstructure, Transition temperature, Transformations, Nuclear reactors.

This report, covering research for the period 1 November 1964 - 31 January 1965, includes the following: (1) results of simultaneous irradiation of five heavy section plates of A302-B steel, (2) comparative irradiation of Charpy-V specimens of weld heat affected zone and base plate of A212-B and A302-B steel, and (3) progress in the continuing study of the effects of nuclear environment upon properties of reactor steels including (a) irradiation of capsules in the Heavy Water Components Test Reactor, (b) removal of the grid plate of the Organic Moderated Reactor Experiment, and (c) disassembly and examination of surveillance capsules from the Big Rock Point Reactor. (Author)

AD-614 925 Div. 20, 13
CFSTI Prices: HC$4.00 MF$0.75

United Research Services Corp., Burlingame, Calif.
EFFECTS OF FIRE ON STRUCTURAL DEBRIS PRODUCED BY NUCLEAR BLAST.
Research rept.,
by J. Rotz, J. E. Edmunds, and K. Kaplan. Jan 65, 114p URS-639-9
Contract OCD PS64 19, Task 3312B
Unclassified report

Includes summary rept. of Structural Debris Caused by Nuclear Blast, URS-639-4.
Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Nuclear explosions, Fires), (*Fires, Nuclear explosions), Airburst, Degradation, Structures, Explosion effects, Nuclear explosion damage, Civil defense systems.

The chief objective of this phase of the program is to evaluate fire effects on debris produced by nuclear weapons. The magnitude of fire from nuclear weapons as a major agent of destruction is discussed. The aftermath of blast and fire is then evaluated in terms of debris. Fire effects on specific types of structures, are discussed with respect to determination of resulting changes in debris quantities. Data from major fires are used to augment this portion of the study. The percent of debris vs overpressure curves (developed in the first phase of the program to predict the amount of debris formed by air blast) are altered to reflect the coupled effects of blast and fire. An example employing data, techniques, and knowledge developed in the program is presented. This takes the form of determination of debris depths along a route through a stricken city. (Author)

AD-614 965 Div. 20, 4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
LIQUID SCINTILLATOR,
by L. M. Kutsyna. 19 Apr 65, 5p FTD-TT-64-1283 TT 65-62154
Unclassified report

Unedited rough draft trans. of Russian patent 155881, appl. 769102/26-24, Mar 15, 1962.

Descriptors: (*Scintillation counters, Liquids), (*Dosimeters, Scintillation counters), Luminescence, Radiological dosage, Diphenyl, Phosphates, Organic phosphorus compounds, Polycyclic compounds, Heterocyclic compounds.

A liquid scintillator, intended for use in radiology and dosimetry, and distinguished by its content of tributylphosphate, methylnaphthaline, and the activator 2, 5-diphenyloxazole, is described. These constituents increase the effectiveness and lessen the volatility.

AD-614 984 Div. 20, 14, 17, 25

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST COORDINATE INDEX, PART II.
Rept. for 1 Oct 64-30 Apr 65,
10 May 65, 13p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Radiation damage, Indexes), (*Indexes, Radiation chemistry), (*Radiation chemistry, Materials), (*Electromagnetic waves, Degradation), Subject indexing, Alpha particles, Deuterons, Electrons, Neutrons, Ions, Protons, Gamma rays, X rays, Photons, Electromagnetic pulses, Ultraviolet radiation.

The inverted concept-coordinate index is a reference for the Monthly Accession List (AD-614 985). The index is subdivided into sections. The first, Radiation Environment, includes dosimetry and energy aspects of all electromagnetic and particulate radiation sources, with the exception of space radiation. Section two deals with materials, properties, secondary environment (including space environments), devices, and all other subject concepts.

AD-614 985 Div. 20, 14, 17, 25
CFSTI Prices: HC$1.00 MF$0.50

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST. ABSTRACT NO. 27166 TO 27222. PART I.
Rept. for 1-30 Apr 65.
10 May 65, 25p REIC Accession list no. 86
Contract AF33 615 1124
Unclassified report

Continuation of Contract AF33 657 10085.

Descriptors: (*Radiation damage, Materials), (*Materials, Radiation damage), (*Bibliographies, Radiation damage), Radiation chemistry, Abstracting, Ceramic materials, Metals, Organic materials, Polymers, Electronic equipment, Space environmental conditions, Semiconductor devices, Electromagnetic waves.

Contents: Dates Covered: April 1, 1965 to April 30, 1965 Metallic Materials; Ceramic Materials; Organic Materials; Polymeric Materials; Inorganic Materials; Electronic Materials, Components, and Devices; Facilities; Space Environment and Effects on Materials; Experimental Devices and Techniques; Miscellaneous.

AD-614 997 Div. 20, 2, 4
CFSTI Prices: HC$3.00 MF$0.75

General Atomic Div., General Dynamics Corp., San Diego, Calif.

FALLOUT STUDIES, CLOUD CHEMISTRY.
Final rept.,
by H. J. Norman, P. Winchell, W. E. Bell, and A. B. Riedinger. 29 Jan 65, 63p Rept. no. GA-6094
Contract OCD PS64 222, Task 3111A
Unclassified report

Descriptors: (*Radioactive fallout, Clouds), (*Clouds, Chemistry), Radioactive isotopes, Cesium, Rubidium, Antimony, Tellurium, Molybdenum, Absorption, Calcium compounds, Alumium compounds, Silicon compounds, Diffusion, Fission products, Silicates, Alkaline earth compounds, Vaporization, Samplers, Ions, Thermodynamics.

The measured absorptions per atmosphere between 1260 and 1400C of Cs, Ru, Sb, Te, and Mo in CaO-A12O3-SiO2 samples with varying SiO2 content are, respectively, 0100 to 10000, 10, 10000, 1, and 100000 to 1000 times the ideal values as calculated by Miller. Attention is called to the effect of gaseous ions on chemistry occurring during fallout formation. Diffusivities of Cs, Sb, Te, and Mo are reported as determined in diffusion-limited evaporation studies and plane-source-technique studies. Variation of diffusivity of Sb with silicate composition was studied. Mass-spectrometric studies of the thermodynamics of vaporization of the alkaline earth oxides are reported. Gaseous species whose thermodynamic properties are reported were found to include M, MO, M2O, and M2O2 species. Microprobe studies of fallout particles revealed concentration gradients for many elements in fallout particles. A discussion is presented of the importance of thermodynamic properties of fission products and silicates and the kinetics associated with the fission-product absorption process, with particular emphasis on condensed-state diffusion and particle accretion events. (Author)

AD-615 050 Div. 20, 26, 30, 31

Pacific Naval Lab., Esquimault (British Columbia).
A THULIUM 170 NUCLEAR GAUGE FOR MEASURING SUPERHEATER TUBE WALL-THICKNESS IN A MARINE BOILER,
by B. F. Peters. 1964, 6p Reprint 64-10
Unclassified report

Pub. in Naval Engineers Journal p887-91 Dec 1964
(Copies available only to DDC users).

Descriptors: (*Non-destructive testing, Radiation measurement systems), (*Radiation measurement systems, Non-destructive testing), (*Nuclear industrial applications, Non-destructive testing), Boilers, Marine engineering, Boiler tubes, Thickness, Measurement, Radioactive isotopes, Geiger counters, Thulium.

The nuclear gauge consists of a radioisotope which can be applied to the exterior of superheater tubes, and a geiger counter tube which can be inserted into the boiler tubes from the header. A sectional drawing of the arrangement is shown. The principle of the nuclear gauge is based on the absorption of radiation by the steel tube wall; the thicker the tube, the lower the count, and the more wastage, the higher the count.

AD-615 055 Div. 20, 4, 16, 20

Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
ION-ION RECOMBINATION IN LABORATORY AIR,
by S. McGowan. 24 Feb 64, 16p
Rept. no. DCBRL-448
Unclassified report

Pub. in Physics in Medicine and Biology v10 n1 p25-40 Jan 1965 (Copies available only to DDC users).

Descriptors: (*Dosimeters, Corrections), (*Ions, Recombination reactions, (*Recombination reactions, Ions), Radiation chemistry, Gas ionization, Ionization chambers, Air, Reaction kinetics, Canada.

The ion-ion recombination rate in laboratory air at atmospheric pressure and room temperature was re-investigated experimentally. Both pulsed and continuous irradiation methods were used. The pulsed source enabled the recombination coefficient to be measured as a function of ion age between 1/2 msec and 1/2 sec. It is shown that the very high initial recombination rates at low ion ages can be satisfactorily explained by the existence of microscopic regions in which the ion density is much higher than the average density over the ionized volume. Decreases in the recombination coefficient which were observed in a few cases at about 50 msec ion age are attributed to changes in the type of ions involved. Day-to-day variations in the recombination coefficient were ascribed to variations in the minor constituents of the air used. The results of pulsed and continuous methods for recombination coefficient are in quantitative agreement yielding a value of .0000014 cc/sec foruntreated laboratory air. Although the air used was not necessarily representative of other laboratory environments, this value shows that for much practical work a recombination coefficient considerably lower than that reported in the literature for carefully dried air should be used. (Author)

AD-615 076 Div. 20, 15

California Inst. of Tech., Pasadena.
COULOMB WAVE THEORY OF STRIPPING,
by Fernando B. Morinigo. 27 Jul 64, 12p
Contract Nonr22047
Unclassified report

Pub. in Nuclear Physics v62 p373-84 1965 (Copies available only to DDC users).

Descriptors: (*Nuclear reactions Electric fields), (*Electric fields, Perturbation theory), Quantum mechanics, Nuclear structure, Nuclear resonance, Differential cross section, Tensor analysis, Operators (Mathematics).

An exact analytic treatment is presented of pure Coulomb distortions in stripping reactions. This first-order theory is anlogous to some of the simplest plane-wave theories; the important innovation consists in the use of pure Coulomb waves instead of plane waves to describe the relative motions in both entrance and exit channels. The projectile is considered to be a bound state of two particles, described by a purely asymptotic wave function of the form exp(-ar)/r. The resultant nucleus is considered to be a bound state of the target particle plus a captured particle, described by a wave function of definite orbital angularmomentum L, with a radial part which may be taken to be any linear combination of terms of the form r to the Lth power exp(-Br)/r. The distorted-wave cross sections predicted are found to contain a factor whose leading term has an angular variation identical to that predicted by the analogous plane wave theory. A second factor, which is identical for all values of L, depends only on the energies and the Coulomb parameters of the relative motions; it represents the overall decrease in magnitude due to the Coulomb repulsions in both incident and exit channels. A third factor contains an additional angular dependence due to the distortions. The angular dependence is found to resemble qualitatively the angular dependence of plane wave theories except possibly in the case that the Coulomb parameters are very large in the entrance and the exit channels simultaneously. Detailed formulae are given for cases of L = 0, L = 1 and L = 2. (Author)

AD-615 142 Div. 20

Oberlin Coll., Ohio.
TOTAL NUCLEON-HELIUM CROSS SECTION NEAR 147 MeV,
by J. N. Palmieri and R. Goloskie. 28 May 64, 4p
Unclassified report

Pub. in Nuclear Physics v59 p253-6 1964 (Copies available only to DDC users).
Supported by ONR.

Descriptors: (*Proton scattering, Nuclear cross sections), (*Helium, Proton scattering), Nucleons, Differential cross section, Nuclear reactions, Neutrons.

Protons with energies of 141 and 154 MeV were scattered by a target containing liquid helium. The cross section was measured for incident protons not to leave the target within a cone (half-angle 6 degrees) in the forward direction. At an average proton energy of 147 MeV the cross section was 113.4±0.8 mb. This datum along with proton-helium differential cross section and polarization data at 147 MeV were analysed using the impulse approximation and yielded a value of the total neutron-helium cross section of 114.5±1.0 mb. (Author)

AD-615 151 Div. 20, 15, 25

Philipps-Universitat, Marburg (West Germany).
Inst. fur Theoretische Physik.
UNITARITY AND REDUCTION FORMULAS;
PRELIMINARY VERSION.
1964, 24p
Contract AF61 052 658
AFOSR 65-0650
Unclassified report

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Descriptors: (*Nuclear scattering, Relativity theory), (*S-matrix, Nuclear scattering), (*Integrals, Nuclear scattering), Iterative methods, Matrix algebra, Operators (Mathematics), Bosons, Fermions, Elastic scattering, Inelastic scattering, Perturbation theory.

The content of x-space reduction formulas in q-space is discussed using the example of fermion-boson scattering. The splitting of the T-operator is shown to correspond to a natural decomposition of the unitarity condition for T, and may be deduced from unitarity alone. Reality conditions for M sub 1 are derived from q-space properties without referenceto x-space. Necessary and sufficient conditions are given for T being unitary. Iteration methods are developed which lead to a determination of elastic amplitudes starting with one-particle-exchange-contributions, i.e., pole terms and form factors, and the whole contribution from inelastic processes as input force. The essential part of the iteration method is a prescription to construct off-shell elements, especially off-shell-one-particle-exchange-contributions.

AD-615 156 Div. 20, 13
CFSTI Prices: HC$1.00 MF$0.50

United Research Services Corp., Burlingame, Calif.
EFFECTS OF FIRE ON STRUCTURAL DEBRIS PRODUCED BY NUCLEAR BLAST.
Summary rept.,
by J. Rotz, J. E. Edmunds, and K. Kaplan. 1964, 15p
Rept. no. URS-639-9
Contract OCD PS64 19, Task 3312B

Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.
See also AD-614 925.

Descriptors: (*Nuclear explosions, Fires), (*Fires, Nuclear explosions), Nuclear explosion damage, Structures, Airburst, Degradation, Explosion effects, Civil defense systems, Blast.

The investigation has revealed that fire is a major factor, and sometimes the primary factor, to be considered in evaluation of debris production from a nuclear attack. The area initially subjected to fire will compare to that for blast damage for small weapons, (megaton range). Fire spread would serve to further increase the area affected by fire. To evaluate fire effects, additional information regarding ignition range and fire resistance of buildings is necessary. With these data and knowledge of the behavior of the type of building involved, its fate after being subjected to fire can be predicted. Use of altered debris curves will enable prediction of the amount of debris that will be produced by the combined effects of blast and fire. (Author)

21. Nuclear Propulsion

AD-614 733 Div. 21

Columbia Univ., New York.
GASEOUS NUCLEAR ROCKET WITH MHD VORTEX FUEL CONTAINMENT,
by K. O. Kessey and R. A. Gross. 17 Feb 64, 4p
Contract AF49 638 1254; Grant AF AFOSR48 63
Proj. 9752, Task 9752 01
AFOSR 65-0572

Unclassified report

Pub. in AIAA Journal v2 n8 p1461-4 Aug 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear propulsion, Containment), (*Spacecraft nuclear propulsion, Containment), (*Magnetohydrodynamics, Nuclear propulsion), Reactor fuels, Gaseous rocket propellants, Vortices, Hydrogen, Uranium, Exhaust gases, Power supplies, Critical assemblies.

One of the major problems in development of a nuclear rocket is the separation of the gaseous fuel from the propellant. In this report some potentialities and limitations of a hydromagnetically driven vortex separation system are examined for a practical nuclear rocket system. The size, flow limitations, composition of the exhaust gas, electrical power, and reactor power required by a hydromagnetic vortex, gaseous nuclear rocket reactor are determined. The simultaneous requirements for nuclear criticality, adequate fuel-propellant separation, input composition to maintain a steady state, and limits on electrical powerplant weight form the crux of an analysis of the system. (Author)

22. Ordnance

AD-614 884 Div. 22, 10

Hull Univ. (England).
THE SELF-INHIBITION OF GASEOUS EXPLOSIONS,
by R. R. Baldwin, N. S. Corney, P. Doran, L. Mayor, and R. W. Walker. 1962, 10p
Grant AF EOAR63 31
AFOSR 64-2022

Unclassified report

Pub. in International Symposium on Combustion (9th) p184-92 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Explosions, Inhibition), (*Hydrogen, Explosions), (*Oxygen, Explosions), Reaction kinetics, Chemical reactions, Gases, Aliphatic compounds, Methane, Butane, Aldehydes, Formaldehyde, Alkenes, Great Britain.

In discussing the conditions under which branched-chain reactions, either of the linear branching or quadratic branching type, can give rise to isothermal explosion, it is usually assumed that the initial values of the parameters (e.g. initiation rate, branching factor, termination constants) determine whether the system is stable or explosive. If, however, a reaction product can inhibit the reaction, substantial modification of the explosion condition may result. Two types of mechanism are discussed, one with linear branching and one with quadratic branching, which illustrate this point. In the case of linear branching, it is shown that the original isothermal limit may be modified to a chain-thermal boundary. Thus, whereas ethane, propane, and butane inhibit the second-explosion limit of H2 and O2 by direct chain-terminating reactions with H, OH, and O, methane and neopentane can inhibit only via their reaction products (formaldehyde in the case of methane, aldehydes and olefins in the case of neopentane). Such products are formed in significant concentrations only after the uninhibited explosion boundary has been crossed and incipient explosion is developing. A variety of evidence supports the view that the character of the explosion changes from the original isothermal chain-branching explosion to a chain-thermal explosion with these two hydrocarbons. (Author)

AD-614 963 Div. 22, 10
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF PRESSURE ON THE COMBUSTION STABILITY OF EXPLOSIVES,
by K. K. Andreev and V. V. Gorbunov. 14 Apr 65, 7p FTD-TT-64-1258
TT 65-62152

Unclassified report

Unedited rough draft trans. of Vsesoyuznoe Khimicheskoe Obshchestvo. Zhurnal (USSR) v8 n5 p592 1963.

Descriptors: (*Explosive materials, Combustion), (*Combustion, Pressure), Tetryl, Organic nitrogen compounds, Potassium compounds, Stability, Reaction kinetics, Heat transfer, Oscillation, USSR.

Changes in various combustion phenomena with pressure are reported for potassium picrate and tetryl.

AD-615 173 Div. 22
CFSTI Prices: HC$2.00 MF$0.50

Institute of Engineering Research, Univ. of California, Berkeley.
INTENSE EXPLOSIONS AT THE AIR-WATER INTERFACE. I. THEORETICAL APPROACH,
by Richard Collins and Maurice Holt. Oct 64, 33p
Rept. no. AS-64-14
Contract Nonr22279

Unclassified report

Descriptors: (*Explosions, Surface properties), Water, Air, Theory, Perturbation theory, Shock waves, Mathematical analysis, Partial differential equations, Differential equations, Iterative methods.

The problem of a point explosion detonated at the interface between two different media, for example, at the ocean surface, is formulated. It is proposed to solve the problem by considering a linear perturbation of the similarity solutions developed for a point explosion in the spherically symmetric case. (Author)

23. Personnel and Training

AD-614 606 Div. 23, 8
CFSTI Prices: HC$3.00 MF$0.75

Human Resources Research Office, George Washington Univ., Alexandria, Va.
THE DEVELOPMENT AND EVALUATION OF AN IMPROVED ELECTRONICS TROUBLESHOOTING MANUAL,
by James P. Rogers and H. Walter Thorne. Mar 65, 58p Technical rept. no. TR-65-1
Contract DA44 188ARO2, Proj. 2J024701A712 01
Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Instruction manuals, Electronic equipment), (*Maintenance, Instruction manuals), (*Electronic equipment, Maintenance), (*Maintenance personnel, Military training), Electronic technicians.

To develop a maintenance manual that would permit a trained technician to troubleshoot electronic equipment faster and more accurately, hypotheses were developed about what information should be presented. An experimental manual was prepared for troubleshooting the Nike Ajax and its test equipment; it contained some information not found in conventional manuals and was organized according to when and how information is to be used. An experimental group using the experimental manual was able to troubleshoot faster and more effectively than a control group using standard schematic and functional diagrams and personal notes. A list of desirable contents for troubleshooting manuals was drawn up, and procedures for preparing troubleshooting manuals were written. (Author)

AD-614 674 Div. 23, 26
CFSTI Prices: HC$3.00 MF$0.75

Georgia Inst. of Tech., Atlanta.
APPLICATIONS OF INDUSTRIAL ENGINEERING IN THE UNITED STATES AIR FORCE.
Master's thesis,
by David Irvin Wright. Mar 65, 63p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Officer personnel, Engineering), (*Engineering, Air force training), (*Air force training, Engineering), (*Personnel management, Air force), Management engineering, Air force personnel, Education, Military requirements.

The following conclusions are drawn from the results of the questionnaires used in the study. The conclusions are qualified in view of the subjective nature of some of the responses to the questionnaires. (1) Officers engaged in Air Force Institute of Technology (AFIT) Industrial Engineering education programs require additional direction and guidance in formulatng their programs of study. (2) Officers who receive Industrial Engineering degrees through AFIT are adequately prepared for most of the specialties to which they are assigned. (3) A significant number of officers with degrees in Industrial Engineering are not being optimally assigned or utilized. (4) The capabilities and potential of modern Industrial Engineering are not sufficiently recognized within the Air Force. (5) Officers who have received their educations in other fields are better suited than Industrial Engineers for some of the specialties to which the latter are assigned. (6) The extent to which officers adapt Industrial Engineering methods and techniques to their specialties is related to their individual initiative and to the attitudes of their superiors. (Author)

AD-614 677 Div. 23, 32
CFSTI Prices: HC$4.00 MF$0.75

Georgetown Univ., Washington, D. C.
AN ECONOMIC MODEL OF STRIKES IN THE UNITED STATES MANUFACTURING INDUSTRIES, 1952-1962.
Masters' Thesis,
by Stephen Kirby Mayo. Jan 65, 105p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Employee relations, Industries), (*Industries, Employee relations), (*Economics, Mathematical models), Labor unions, United States, History, Analysis, Theory, Wages.

Contents.
Theoretical basis for the analysis of strikes
Formulation of an 'economic' regression model
Strikes in the U. S. manufacturing industries, 1952-1962.

AD-614 697 Div. 23
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
FIVE MAJOR OBSTACLES TO THE GROWTH OF PROGRAMMED INSTRUCTION IN EDUCATION,
by John E. Coulson. 13 Apr 65, 10p
Rept. no. SP-1944
Unclassified report

Presented at the national convention of the National Society for Programmed Instruction, Philadelphia, May 6, 1965.

Descriptors: (*Education, Training), (*Training devices, Education), Computers, Learning.

The obstacles discussed are: (1) a lack of understanding in the educational community of what it means to define educational objectives in operational terms, (2) the tendency of program producers and school administrators to force programs on the teachers without enlisting the teachers' support or telling them how the materials should be used in the ongoing classroom, (3) too stereotyped and unimaginative a view of programmed instruction on the part of program writers, (4) lack of consideration, by program producers and users alike, of the impact that programmed instruction must have on all parts of a school system if the potential advantages of individualized progress are to be realized, and (5) lack of proper lesson shaping by empirical cut-and-fit techniques, of the programmed materials being produced and sold today. General approaches to eliminating these obstacles are suggested. (Author)

AD-614 698 Div. 23
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
THE SYSTEMS APPROACH, TECHNOLOGY AND THE SCHOOL,

by Launor Carter and Harry Silberman. 1 Apr 65, 33p Rept. no. SP-2025

Unclassified report

Speech at Conference to Mark the Dedication of Ben D. Wood Hall, May 11, 1965, Educational Testing Service, Princeton, N. J.

Descriptors: (*Education, Systems engineering), (*Systems engineering, Education), Training, Computers, Test methods, Teaching machines, Simulation.

Discusses the ideal school and the deficiencies in the present educational system. Describes some of the recent advances in educational technology, using as a point of reference the educational research and development at the System Development Corporation. Indicates the measures to be taken to achieve the ideal school. (Author)

AD-614 714 Div. 23, 28
CFSTI Prices: HC$2.00 MF$0.50

Naval Medical Research Lab., New London, Conn.
COMPREHENSIVE VALIDATION OF SUBMARINE SONAR SELECTION TESTS.
Final rept.,
by J. Donald Harris. 30 Sep 46, 40p
Projs. X327, X330, Tasks 56, 59

Unclassified report

Descriptors: (*Sonar personnel, Selection), (*Auditory perception, Psychometrics), Psychoacoustics, Noise, Pitch discrimination, Memory, Performance tests, Aptitude tests, Learning, Training, Motor reactions, Correlation techniques.

An analysis of the relation of a large number of selection tests to success in sound school was performed on data from four consecutive classes. A summary report is given of four of these selection tests,

AD-614 835 Div. 23, 28
CFSTI Prices: HC$2.00 MF$0.50

Directorate of Civilian Personnel (AF), Washington, D. C. Personnel Research Branch.
DEVELOPING A BATTERY OF PREDICTORS FOR SELECTION OF AIR FORCE WRITERS. I. PRETESTING MEASURES OF ENGLISH USAGE AND MECHANICS,
by James D. Teller. 1 Oct 64, 27p
Research rept. no. RR-64-1

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Air force personnel, Selection), (*Psychometrics, Air force personnel), Language, Manpower studies, Officer personnel, Factor analysis, Tests, Test methods.

A college-level test of usage and mechanics (Form 1A of the Cooperative English Expression Test) was administered to 102 higher level civilian employees assigned to Headquarters USAF. These employees estimated the time spent in producing nine types of written products, such as, letters and technical reports. In addition, the executives who review these nine types of products rated the extent to which each type met their standards of usage, spelling, punctuation, and capitalization and also rated the overall effectiveness of all the products as a whole and the potential of the writer for assuming writing tasks of increased scope and difficulty. The range of the Pearson Product Moment coefficients of correlation of these criterion variables shows either that we are dealing with a very complex criterion or with one that is extremely vague. However, if we are willing to settle for the rating of writing potential by these executives, the correlation of the test with this criterion is .33 which is well above the 1% level of statistical significance and explains about 11% of the variance associated with this criterion. (Author)

AD-614 969 Div. 23
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AND SUCH AS HE IS,
by G. Aleksandrov. 14 Apr 65, 6p
FTD-TT-64-1362
TT 65-62158

Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) p3 Aug 6 1964.

Descriptors: (*Astronauts, USSR).

A popularized article on Russian cosmonauts is presented.

AD-615 056 Div. 23, 18

Advanced Research Projects Agency, San Francisco, Calif. 96346. Research and Development Field Unit.
HISTORICAL PROCEDURES OF RECRUITING GUERILLAS,
by Franklin Mark Osanka. 1963, 6p

Unclassified report

Pub. in Australian Army Journal n185 p8-14 Oct 1964 (Copies available only to DDC users).

Descriptors: (*Guerrilla warfare, Recruiting), (*Recruiting, Guerrilla warfare), Psychological warfare, History, Australia.

The report is concerned with the various historical techniques of recruiting non-combatant civilians for the guerilla force. The paper does not pretend to cover all of the factors involved, nor does it address itself to guerilla recruiting techniques as practiced in any specific past or current guerilla movement.

AD-615 091 Div. 23, 19, 28

Pittsburgh Univ., Pa.
EVALUATING NAVIGATOR PROFICIENCY BY DUPLICATION SIMULATION.
Master's thesis,
by John H. Manley. 1965, 232p

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Navigation, Training devices), (*Navigators, Air force training), (*Air force training, Navigators), Instruction manuals, Standardization, Performance (Human), Mission profiles, Human engineering, Simulation, Computers, Programming (Computers).

The central theme of this thesis involves that of universally standardizing the entire body of current

navigation practice using modern Industrial Engineering methods. Only the first step in the procedure is actually demonstrated to be feasible, i.e., the new technique of evaluating navigator proficiency in selected areas using duplication simulation. The practical significance of these tentative probings, together with speculation as to how an extensive long-range research program should be conducted, are discussed at length. Finally, assuming that such an investigation as that proposed could be carried out, the numerous valuable benefits which would accrue to a military manager are explained in detail. Since the subject matter involves United States Air Force activities, details bordering on security areas are not discussed and certain technical data have been used which are purposely not current; however, these two minor limitations do not in any way affect the techniques demonstrated, nor do they affect the conclusions drawn.

AD-615 129 Div. 23, 30
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
EDUCATION AND COMPUTER TECHNOLOGY,
by John F. O'Toole, Jr. 3 May 65, 30p
Rept. no. SP-1989
Proj. F026 Unclassified report

Descriptors: (*Education, Computers), (*Computers, Education), Digital computers, Data processing systems, Instructors, Teaching machines.

Acceptance of the high-speed digital computer has been remarkably favorable, especially in national defense, in business and industry, and in science. Applications in these fields are briefly described. Education is discussed in terms of the types of information problems that are woven through the fabric of the entire educational process; from problems of collecting, storing, communicating, retrieving, and displaying information; to problems of receiving, learning, and using information. These problems are considered amenable to solution by computer applications. Some of the values and forces underlying American education are described, as well as some of the responses of the educational system to changing needs, e.g., curriculum reform, programmed instruction, school organization, instructional materials, and the education of teachers. These values, forces, and responses are discussed within the framework of requirements for more efficient information processing systems as provided by computers. (Author) (Revision of a chapter in a study report submitted to the U. S. Office of Education, 'Application of electronic data processing methods in education', Jan 1965)

24. Photography and Other Reproduction Processes

AD-614 767 Div. 24
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BASIC FACTORS DETERMINING THE RESOLVING POWER OF PHOTOGRAPHIC MATERIALS,
by G. G. Gribakin and G. A. Istomin. 7 Apr 65, 8p
FTD-TT-65-293
TT 65-62087

Unclassified report

Unedited rough draft trans. of Zhurnal Nauchnoi i Prikladnoi Fotografii i Kinematografii (USSR) v9 n1 p57-9 1964.

Descriptors: (*Photographic materials, Resolution), Photographic emulsions, Diffusion, Photographic contrast, Photographic grain, Photographic images, Equations, USSR.

An equation is derived which describes the resolving power of photographic materials in terms of diffusion of light by the emulsion layer, the contrast coefficient, and granularity of the photographic density.

AD-614 768 Div. 24
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SYMPOSIUM ON THE STRUCTURAL PROPERTIES OF PHOTOGRAPHIC LAYERS AND THEIR INFORMATION CAPABILITY,
by I. I. Breido. 7 Apr 65, 8p FTD-TT-65-294
TT 65-62088

Unclassified report

Unedited rough draft trans. of Zhurnal Nauchnoi i Prikladnoi Fotografii i Kinematografii (USSR) v9 n2 p155-6 1964.

Descriptors: (*Photographic materials, Structural properties), Photographic images, Processing, Photographic acutance, Photographic grain, Photographic contrast, Optical properties, Symposia, USSR.

The importance of an over-all evaluation of the structural properties of photographic materials which determine the quality of the photographic image is stressed. It is stated that measurement of the resolving capability alone is not sufficient for this purpose; it is necessary to consider other methods of evaluating structural properties and of comparing them. The sensitivity of a photographic material must not be considered separately from its ability to reproduce small image elements or from its information capability.

AD-615 106 Div. 24, 30
CFSTI Prices: HC$5.00 MF$1.25

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROGRAMMABLE FILM READER,
by A. W. Armenti, D. F. Clapp, A. I. Schulman, and R. A. Wiesen. 10 Mar 65, 194p
Technical note no. TN-1965-1
Contract AF19 628 500
ESD TDR-65-57

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Film readers, Analog-to-digital converters), (*Analog-to-digital converters, Film readers), (*Programming (Computers), Film readers), Digital computers, Magnetic tape, Cathode ray tubes, Film transport systems, Circuits, Electron optics, Photomultipliers, Relaxation oscillators, Filters (Electromagnetic wave, Programming languages, Compilers.

The Programmable Film Reader, consisting of digital computer, magnetic tape units, CRT, and film transport with optical and electronic circuits, is a device for reducing radar A-scope film data to digital form. This is done by scanning selected portions of the film with a spot of light under program control. The relative amount of light passing through the film is measured by the device and reported back to the computer for processing. A set of computer programs, called the Film Reading Program System, has been written for the PDP-1 computer and Programmable Film Reader. These programs will read films in three formats; A-scope traces, A-scope traces with fiducial marks and Project Radar A-scope traces. The amplitudes of the traces are sampled up to about 500 times and the digitized results written onto magnetic tape in IBM format. This report presents a description of the computer programs together with flow charts and listings. The reader is presumed familiar with the PDP-1 computer and the MACRO assembly language. The latest modification to the system adapts it for use with the MIDAS assembly program and with a new high-speed magnetic tape system on the PDP-1 computer. (Author)

25. Physics

AD-614 566 Div. 25, 17
CFSTI Prices: HC$4.00 MF$1.00

Lockheed Missiles and Space Co., Sunnyvale, Calif.
SELF-DIFFUSION OF LEAD AND TELLURIUM IN LEAD TELLURIDE.
Doctoral thesis,
by Mario Pio Gomez. Jun 64, 144p LMSC-A034298
Unclassified report

Descriptors: (*Diffusion, Intermetallic compounds), (*Intermetallic compounds, Diffusion), (*Tellurium alloys, Lead alloys), (*Lead alloys, Tellurium alloys), Phase studies, Crystal lattice defects, Tracer studies, Atomic energy levels, Impurities, Heat of activation, Temperature.

The defect structure of PbTe was investigated by studying the self-diffusion of Pb and Te as a function of deviation from stoichiometry and temperature. Microlapping and radioactive tracer techniques were used to determine the diffusion coefficients from concentration vs. penetration profiles corresponding to the Van Ostrand-Dewey solution of Fick's second law. The self-siffusion of Pb-210 can be explained by assuming that two mechanisms operate, one at high Te concentrations with an activation energy of 61 Kcal per mole and one at low Te concentrations and excess Pb with an activation energy equal to 24 Kcal per mole. The diffusion coefficient D sub pb exhibited a minimum at all temperatures and at compositions close to stoichiometry, on the Te side. The Te self-diffusion coefficient decreases with decreasing Te concentration and has an activation energy equal to 24 Kcal per mole. From the dependence of the diffusivities upon concentration and temperature it has been concluded that Frenkel defects are present in the Pb sublattice and that interstitial Te is the predominant anion defect. (Author)

AD-614 567 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
STRAIN-ENERGY RATES FOR A CLASS OF PERTURBATIONS OF BOUNDARY GEOMETRIES,
by Oscar L. Bowie. Jan 65, 14p
Technical rept. no. AMRA-TR-65-01
Proj. 1C014501B32A, Task 35781
Unclassified report

Descriptors: (*Elasticity, Fracture (Mechanics)), (*Fracture (Mechanics, Elasticity), Perturbation theory, Strain (Mechanics), Energy, Stresses, Mathematical analysis, Boundary valve problems, Sheets, Tensile properties, Geometric forms.

An argument of Irwin is formalized and extended within the framework of linear elasticity for the change in strain energy associated with a class of perturbations of boundary geometry. Application of the argument to the calculation of the rate of change of the elastic strain energy for a family of edge notches in tensile sheet is then demonstrated. (Author)

AD-614 574 Div. 25, 17
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania State Univ., University Park.
Dept. of Engineering Mechanics.
A TRIAXIAL EXPERIMENT ON YIELD CONDITION IN PLASTICITY,
by L. W. Hu, J. Markowitz, and T. A. Bartush.
Jan 65, 23p
Grant AF AFOSR127 64
AFOSR 65-0313
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Plasticity, Creep), (*Brass, Creep), Stresses, Hydrostatic pressure, Loading (Mechanics), Experimental data.

A triaxial stress experiment was developed for the determination of the intersections of the initial and subsequent yield surfaces with a hydrostatic stress-principal stress plane. Results of an experiment on Nittany Brass No. 2 of the soft grade were reported. Information so obtained makes it possible for one to see the yield condition in the sense of a three dimensional surface rather than a two dimensional curve as observed in conventional biaxial stress tests. (Author)

AD-614 575 Div. 25, 17
CFSTI Prices: HC$2.00 MF$0.50

Pennsylvania State Univ., University Park.
Dept. of Engineering Mechanics.
LOAD-CARRYING CAPACITIES FOR RECTANGULAR PLATES OF ANISOTROPIC MATERIALS,
by L. W. Hu. Jan 65, 28p
Grant AF AFOSR127 64
AFOSR 65-0314
Unclassified report

Descriptors: (*Metal plates, Loading (Mechanics)), (*Loading (Mechanics), Metal plates), Sheets, Copper, Steel, Anisotropy, Rectangular bodies, Plasticity, Deformation, Numerical analysis.

A complete solution to the load-carrying capacities of rectangular plates with anisotropy is obtained. The plates are simply supported and subjected to uniformly distributed load. The anisotropy is described by the modified v. Mises yield condition suggested by Hill. Also, a complete solution to the load-carrying capacities of isotropic plates is derived from the aforementioned solution as a special case. (Author)

AD-614 588 Div. 25, 4
CFSTI Prices: HC$3.00 MF$0.75

IIT Research Inst., Chicago, Ill.
PHASE EQUILIBRIA OF DRY AIR AT LOW PRESSURE.
Final rept.,
by R. A. Budenholzer and G. Walker. Jan 65, 78p
Contract AF33 657 11324, Proj. 7065, Task 706503
ARL 65-1
Unclassified report

Descriptors: (*Phase studies, Air), (*Air, Cryogenics), (*Cryogenics, Low-pressure research), Oxygen, Nitrogen, Mixtures, Enthalpy, Vapor pressure, Dew point, Bubbles, Liquified gases, Solidified gases.

Phase equilibria for an oxygen-nitrogen mixture equivalent to dry air (21% oxygen and 79% nitrogen) were computed for the temperature range 65K to 35.61K. Dew-point and bubble-point pressures for the mixture were evaluated. Experimental measurements were made of the bubble-point vapor pressure of a dry air mixture in the temperature range 34K to 64K. Samples

of the bubble-point equilibrium vapor of a dry air mixture were obtained in the temperature range 47K to 64K. These were analyzed to determine the mole composition of the vapor in terms of oxygen and nitrogen content. (Author)

AD-614 612 Div. 25, 4
CFSTI Prices: HC$1.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
SOLID-LIQUID PHASE EQUILIBRIUM IN BINARY SYSTEMS OF TRIPHENYL ANTIMONY WITH BIPHENYL, NAPHTHALENE, AND BENZOIC ACID.
Physical Sciences Research Papers,
by Marvin S. Brooks. Mar 65, 24p
Paper no. PSRP-86, AFCRL 65-185
Proj. 5620, Task 562001
Unclassified report

Descriptors: (*Phase studies, Metalorganic compounds), (*Metalorganic compounds, Phase studies), Semiconductors, Solid state physics, Antimony compounds, Eutectics, Organic solvents.

During the course of zone refining studies on a number of binary organic systems, it became necessary to determine their phase diagrams. Using the isoplethal method of thermal analysis, the diagrams were derived for three systems: triphenyl antimony-benzoic acid; triphenyl antimony-biphenyl; triphenyl antimony-naphthalene. All three systems are of the single eutectic type. The eutectic points are at 0.797 mole fraction triphenyl-antimony 293K in biphenyl; 0.766 mole fraction triphenyl-antimony 298K in naphthalene; 0.868 mole fraction triphenyl-antimony 305K in benzoic acid. The eutectic temperatures in these systems were determined with some difficulty. The cooling curves exhibited no temperature halts or irregularities; therefore it was concluded that no compound formation existed. The available pair of electrons on triphenyl antimony apparently did not interact with any of the three organic solvents. This behavior is similar to that of the trihalides of As, Sb, and Bi in which there is very little tendency to utilize the unshared electrons in donor-acceptor reactions. (Author)

AD-614 615 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Defense Research Corp., Santa Barbara, Calif.
INTERACTION OF HIGH INTENSITY RADIATION AND MATTER.
Final rept. for Oct 64-Mar 65,
by Peter Redmond. 1 Apr 65, 4p
Contract DA31 124ARO D94, Proj. 20010501B700
AROD 4157:4
Unclassified report

Descriptors: (*Beams (Electromagnetic), Lasers), (*Lasers, Electromagnetic properties), Scattering, Field theory, Plasma physics, Refractive index, Harmonic oscillators, Particles.

During the period several problems involving the interaction of intense laser beams with materials were studied. The five investigations carried out are briefly summarized.

AD-614 621 Div. 25

University Coll. of Wales, Cardiff.
RADIATIVE CASCADE THEORY,
by P. Lal and P. T. Landsberg. 1 Jan 65, 29p
Scientific rept. no. SR-4
Contract AF61 052 664 Unclassified report
AFCRL 65-182

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is not available for public sale.

Descriptors: (*Quantum mechanics, Cascade structures), (*Cascade structures, Quantum mechanics), (*Electron transitions, Cascade structures), Continuum mechanics, Ground state, Pumping (Electronics), Atomic energy levels, Blackbody radiation, Quantum statistics, Astrophysics, Solid state physics, Plasma physics, Hydrogen, Ions.

A theory is developed for the radiative cascade between a continuum and the states of hydrogen-like ions. It is assumed that a steady state can be maintained by pumping electrons from the ground states into the continuum. The various electronic transitions which occur in such a situation are assumed to be radiative. This problem does not seem to have been treated explicitly in solid state physics (when the continuum can be a conduction band), except for the formal considerations by Nagae (1963). It has, however, received attention in astrophysics (Seaton, 1959; Bates et.al., 1962). The present paper is written in such a way that it can be used also in astrophysics.

AD-614 631 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON A FUNCTION CHARACTERIZING ENERGY DISSIPATION IN ELASTIC OSCILLATORY SYSTEMS,
by P. M. Senik. 8 Feb 65, 16p FTD-MT-64-395
TT 65-62079
Unclassified report

Edited machine trans. of mono. Voprosy Rasseyaniya Energii pri Kolebaniyakh Uprugikh Sistem: Trudy Nauchno-Teknicheskogo Soveshchaniya (Questions of Energy Dissipation During Oscillations of Elastic Systems) np p40-53 1962.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is available for public sale.

Descriptors: (*Elasticity, Oscillation), (*Oscillation, Energy), Potential theory, Functions, Numerical analysis, USSR.

AD-614 640 Div. 25, 9
CFSTI Prices: HC$2.00 MF$0.50

Brown Univ., Providence, R. I.
ABSORPTION AND EMISSION CHARACTERISTICS OF AN IDEAL RADIATING GAS,
by Merwin Sibulkin. Apr 65, 45p Rept. no. 7
Contract Nonr56235, Proj. NR061 132
Unclassified report

Descriptors: (*Gases, Spectroscopy), (*Heat transfer, Thermal radiation), Line spectrum, Absorption spectrum, Band spectrum, Continuous spectrum, Frequency, Temperature, Numerical analysis, Functions, Equations, Fluid mechanics.

An approximate analysis of the radiative properties of gases is presented for use in problems of fluid mechanics involving radiative transfer of energy. Results are obtained for both line and continuum spectral absorption coefficients as functions of frequency and temperature. The corresponding emission coefficients are integrated to obtain Planck mean absorption coefficients. These results are presented in a nondimensional form which clarifies their meaning and gives insight into the

numerical magnitudes of significant radiative properties. It is found, for example, that for monatomic gases in the temperature range considered, T < 30,000K (say), the emission from atomic lines always exceeds that from the continuum. After comparing the photon mean free paths with the particle mean free paths, it is found that the Planck photon mfp is much longer than the particle mfp but that the photon mfp corresponding to the peak line absorption coefficient is much shorter than the particle mfp. (Author)

AD-614 641 Div. 25, 9
CFSTI Prices: HC$3.00 MF$0.75

Brown Univ., Providence, R. I.
ON GAS DYNAMICS WITH NONEQUILIBRIUM RADIATIVE AND COLLISIONAL IONIZATION,
by Joseph H. Clarke and Carlo Ferrari. Apr 65, 60p Rept. no. 8
Contract Nonr 56235, Proj. NR061 132

Unclassified report

Descriptors: (*Gas ionization, Nonequilibrium flow), (*Shock waves, Theory), Dynamics, Thermal radiation, Blackbody radiation, Atomic spectroscopy, Line spectrum, Photochemistry, Photons, Mathematical models, Statistical processes, Momentum, Functions, Equations, Energy, Gases.

The dynamics of a gas undergoing nonequilibrium ionization by both radiative (bound-free) and collisional transitions is formulated. It is shown that collisional ionization rates, if small, must never be completely neglected compared with the radiative rates, so a complementary limit for slow collisional rates does not exist. The ionization rates and emission and absorption coefficients are all evaluated explicitly from statistical results available for the monatomic gas considered. It is shown that spectral complexities can sometimes be removed by expansion in terms of a large thermal parameter, and there emerges rationally a gas which is approximately gray above the edge frequency. The general theory is applied to the strong normal shock wave structued by the nonequilibrium ionization processes. The nature of this problem is examined, the complete structure is computed, the photoionization in the precursor portion of the shock structure is also determined according to the black-body emitter model for comparison, and the spectral as well as a directional approximation are assessed.

AD-614 642 Div. 25, 15
CFSTI Prices: HC$2.00 MF$0.50

TRG, Inc., Melville, N. Y.
IMPEDANCE MODEL OF FABRY-PEROT RESONATORS,
by S. R. Barone and M. C. Newstein. Feb 65, 36p
Scientific rept. no. SR-6
Contract AF19 604 8817, Proj. 4645, Task 464502
AFCRL 65-210

Unclassified report

Descriptors: (*Cavity resonators, Interferometers), (*Electrical impedance, Cavity resonators), Mirrors, Lasers, Reflectors, Field theory, Partial differential equations, Calculus of variations, Green's function.

It is shown that the mode characteristics of a general class of open interferometers - Fabry-Perot resonators with flat mirrors of arbitrary aperture shape separated by the distance L can be determined in the high frequency limit by the solution of a two dimensional problem of a scalar field defined in the plane of a mirror, satisfying the helmholtz equation (del squared + 2Dk/1L)f = O, and the impedance boundary condition at the edge of the mirror f'/f = 1 sq-root(3k/exp(-1 pi/2)L). The eigenvalues D are simply related to the complex resonant frequencies from which one obtains the diffraction losses and phase shifts. The derivation of an impedance problem is a generalization of a similar result previously obtained for the special case of parallel strip interferometers. (Author)

AD-614 645 Div. 25, 9
CFSTI Prices: HC$3.00 MF$0.75

Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
ON THE HYDROMAGNETIC STABILITY OF A LIQUID LAYER UNDER THE ACTION OF A MAGNETIC FIELD AND A GRAVITATIONAL FORCE,
by Jose Luis Urrutia and I-Dee Change. Feb 65, 61p Technical rept. no. TR-11, SUDAER-218
Contract Nonr22530

Unclassified report

Descriptors: (*Liquids, Electrical conductance), Stability, Magnetic fields, Gravity, Motion, Magnetohydrodynamics, Mathematical analysis, Differential equations.

The dissertation is concerned with an analytical study of the stability of an electrically conducting liquid layer subjected to a gravitational field and a magnetic field. The main purpose of the investigation is to determine the effect of a magnetic field on the stability criteria of the layer.

AD-614 647 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
ATTEMPTS TO CALCULATE MOVING STRIATIONS,
by Alford L. Ward. 15 Feb 65, 31p
Rept. no. TR-1276
Projs. DA1C014 501B11A, 96600

Unclassified report

Descriptors: (*Gas discharges, Mathematical analysis), (*Plasma oscillations, Mathematical analysis), Discharge tubes, Electrons, Ions, Glow discharges, Air, Neon, Mathematical models.

An existing computer program was used in an attempt to understand moving striations. The large disparity between electron and ion mobilities and the steep field-gradient in the cathode-fall region, often leading to negative fields, have prevented a full test of the model. However, computations indicate that the quasi-static voltage of a low-pressure, abnormal glow-discharge is a strong function of the ion distribution in the cathode-fall region. This effect is equivalent to a negative resistance and thereby initiates low frequency oscillations. Higher frequency oscillations were also calculated which may correspond to observed negative striations and anode glow oscillations. Artificial striations introduced as initial conditions show that the striations move toward the cathode with a velocity somewhat greater than the ion velocity in the average field. Calculations are being continued. (Author)

AD-614 651 Div. 25, 8
CFSTI Prices: HC$2.00 MF$0.50

Airborne Instruments Lab., Inc., Deer Park, N. J.
STUDY OF SOLID-STATE AND TRAVELING-WAVE MASER TECHNIQUES.

Quarterly technical rept. no. 5,
by J. A. DeGruyl, W. W. Heinz, S. Okwit, and J. G. Smith. Mar 65, 28p
Contract AF30 602 2989, Proj. 4506, Task 450602
RADC TR-65-30

Unclassified report

See also AD-610 317.

Descriptors: (*Masers, Broadband), Solid state physics, Traveling-wave tubes, Waveguides, Limiters, Semiconductor devices, Pumping (Electronics), Cryogenics.

The purpose of this program is to develop improved maser techniques and apply them to a broad-band maser system. The final design parameters of the broad-band maser system have been established and a description of the breadboard system is presented in this report. Fabrication and procurement of the breadboard components have begun. A ridged-waveguide semiconductor limiting structure has been developed and the results obtained with it are also presented in this report. Limiting characteristics have been improved; however, additional work is necessary in order to lower the limiting level so that the maser is adequately protected. (Author)

AD-614 654 Div. 25, 8
CFSTI Prices: HC$5.00 MF$1.00

Royal Inst. of Tech., Stockholm (Sweden). Microwave Dept.
INTERACTION BETWEEN MICROWAVES AND PLASMAS IN GAS DISCHARGES AND SEMICONDUCTORS.
Final scientific rept.,
by B. Agdur. 31 Mar 65, 154p
Contract AF61 052 796
RADC TR-65-173

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Microwaves, Plasma physics), (*Plasma medium, Microwaves), (*Gas discharges, Plasma physics), (*Semiconductors, Microwaves), Microwave amplifiers, Wave transmission, Propagation, Waveguides, Electrons, Whistlers, Ions, Discharge tubes, Plasma oscillations, Doppler effect, Coaxial cables, Indium alloys, Antimony alloys, Cyclotron waves, Sweden.

Contents:
Waves in hot anisotropic electron-plasmas
Wave propagation in a parallel-plate waveguide partially filled with a hot and inhomogeneous plasma
The influence of collisions on whistler propagation
Experiments on plasma microwave interaction
Ion waves on bounded plasmas
Determination of electron drift velocity in a gaseous discharge from Doppler shifts of plasma waves
An experimental investigation of coupling to slow waves in a plasma waveguide
An experiment on helicon waves in InSb.

AD-614 659 Div. 25, 30

Institute of Optics, Univ. of Rochester, N. Y.
OPTICAL LENS SYSTEMS DESIGN FORMULAE FOR HIGH SPEED COMPUTERS.
Quarterly status rept. no. 4,
by Robert E. Hopkins. 31 Mar 65, 9p
Contract DA30 069AMC534A

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Lenses, Design), (*Prisms (Optics), Design), (*Programming (Computers), Lenses), Glass, Reflections, Mirrors.

Effort is to be expended on the following: (1) improve and extend the optical design features in ORDEALS; (2) study the effects of choice of glass, especially on secondary color; (3) study 3- and 4-element objectives; and (4) refine a program that makes drawings of optical components as viewed from any vantage point. The FLAIR program was put into operation. A prism system was designed by use of the matrix method already published (Applied Optics, 3:1447 (1964)). The prism used as an illustration is the Frankford Arsenal Prism No. 7 (MIL-HDBK-140, pages 13-52)

AD-614 662 Div. 25, 17, 26
CFSTI Prices: HC$2.00 MF$0.50

Harvard Univ. Cambridge, Mass. Div. of Engineering and Applied Physics.
A STATISTICAL THEORY OF WORK-HARDENING.
Interim technical rept.,
U. F. Kocks. 22 Mar 65, 47p
Contracts Nonr186627, SD88, Proj. NR031 503

Unclassified report

Descriptors: (*Deformation, Hardening), (*Crystal lattice defects, Deformation), (*Metals, Deformation), Stresses, Mathematical analysis, Strain (Mechanics), Theory, Crystals, Statistical functions, Metallography.

The consequences of a random distribution of obstacles to the movement of dislocations are examined. Firstly, it is proven that a critical applied stress exists; it is determined by a critical value of the fraction of passable obstacles such that the average dislocation segment can keep moving. There is thus no limit to the expandability of a convex dislocation loop; however, the moving dislocation leaves debris behind in the form of concave loops around areas surrounded entirely by impassable obstacles. The rate of this primary dislocation storage with strain, if one considers monopoles only, is very low and again depends on the critical fraction of passable obstacles only, not on any properties of the distribution, i.e., not on the arrangement of dislocations. The absence of large-scale regularity in the obstacle structure alone (whatever the nature of the obstacles may be) can thus explain 'stage II' hardening which is characterized by a value of about 1/300 of the shear modulus, independent of all conceivable parameters within wide limits. The structure of the work-hardened crystal, thus derived in a semi-phenomenological way, also offers itself for appealing mechanistic interpretations of more complicated phenomena such as latent hardening, dynamic recovery, and some metallographic observations. (Author)

AD-614 687 Div. 25, 8
CFSTI Prices: HC$4.00 MF$1.00

New Mexico State Univ., University Park.
EXPERIMENTAL AND THEORETICAL INVESTIGATIONS OF THE SECONDARY ELECTRON EMISSION PHASE ANGLE DISTRIBUTIONS IN A LOW PRESSURE MULTIPACTING ELECTRICAL DISCHARGE.

Doctoral thesis,
by August Miller. Jun 61, 121p
Unclassified report

Descriptors: (*Electric discharges, Secondary emission), (*Secondary emission, Electric discharges), Electrons, Distribution, Low-pressure research, Phase (Electronics), Calculations, Theory.

Experimental and theoretical investigations of the multipacting electrical discharge have been carried out for the purpose of extending the knowledge of the electron phase angle distributions found within the discharge. The theoretical studies included the development of a high speed computer program for calculation of the electron emission phase angle distributions by a method of successive approximations. The results of those calculations are compared to those obtained by earlier investigators who used several questionable assumptions. The experimental investigations have resulted in the reporting of a new phenomenon occurring within the multipacting discharge, as well as the experimentally determined properties of that phenomenon. Some discussions of the possible origin of the phenomenon are included. (Author)

AD-614 692 Div. 25, 17, 26
CFSTI Prices: HC$3.00 MF$0.75

Northwestern Univ., Evanston, Ill. Dept. of Materials Science.
THE SUBSTRUCTURE OF Cu3Au AFTER TENSILE DEFORMATION AND SHOCK LOADING,
by D. E. Mikkola and J. B. Cohen. 15 Mar 65, 57p
Technical rept. no. TR-5
Contract Nonr122820, Proj. 031 680
Unclassified report

Descriptors: (*Deformation, Crystal substructure), (*Crystal substructure, Copper alloys), (*Copper alloys, Gold alloys), (*Gold alloys, Copper alloys), Crystal lattice defects, Deformation, Loading (Mechanics), Shock (Mechanics), Microscopy, X-ray diffraction analysis, Cryogenics, Strain (Mechanics).

Optical and transmission microscopy and x-ray diffraction were employed to study the substructure. Specimens were also deformed in ordinary tension at 77 K and 298 K for comparison. There was no sudden increase in the dislocation densities or marked change in dislocation arrangement in the shock-loaded specimens corresponding to the rise in energy and resistivity. The dislocation densities for both initial states were similar and of the order of 10 to the 11th power per sq cm after a shock of 370kb, only about 30 pct. greater than the densities found in ordinary tensile testing of Cu3Au to the same strain. Antiphase domain boundaries were created in the ordered alloy on both (001) and (111) planes, with about equal probability during shock loading and the probabilities of these boundaries were an order of magnitude greater than after ordinary tension to the same strain. After tensile testing at 77 K the antiphase boundaries were primarily on (111), but at 298 K these were primarily on (001). The degree of long-range order was 0.6 after 25 pct. strain by shock loading, but 0.95 after tensile deformation to this strain. Disordering was due to the creation of these boundaries. Work hardening was not affected by them.

AD-614 711 Div. 25, 17
CFSTI Prices: HC$3.00 MF$0.75

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
STATIC BUCKLING AND POSTBUCKLING CHARACTERISTICS OF THIN-WALL ALUMINUM CYLINDERS UNDER ECCENTRIC COMPRESSIVE AXIAL LOADS,
by James J. Kotanchik, Emmett A. Witmer, and Theodore H. H. Pian. Dec 64, 59p
Rept. no. ASRL-TR-121-4 Unclassified report
Contract AF04 694 427

Descriptors: (*Buckling (Mechanics), Structural shells), (*Structural shells, Aluminum alloys), Cylindrical bodies, Loading (Mechanics), Deflection, Tests.

Results from experimental measurements of buckling threshold and postbuckling characteristics of thin-wall aluminum-alloy circular cylinders loaded at various fixed ratios of axial compressive load to applied bending moment are reported. Buckling modes, both symmetric and antisymmetric, with respect to the plane of loading occurred and are presented. Typical results are shown. Postbuckling measurements of load-deflection characteristics are extended to very large deflections, and include a number of measurements during unloading and reversed loading. (Author)

AD-614 712 Div. 25, 5
CFSTI Prices: HC$3.00 MF$0.75

Texas Instruments, Inc., Dallas.
SOLID-STATE TECHNIQUES FOR MODULATION AND DEMODULATION OF OPTICAL WAVES.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 64,
by Dayton D. Eden. 31 Dec 64, 60p
Rept. no. U6-802400-6
Contract DA36 039AMC03250E, Proj. 1P6 22001A056
Unclassified report

Continuation of Contract DA36 039SC89221.
See also AD-614 712.

Descriptors: (*Light transmission, Electron optics), (*Demodulation, Light), (*Modulation, Light), (*Solid state physics, Optical phenomena), Light communication systems, Feasibility studies, Modulators, Demodulators, Ferroelectric crystals, Potassium compounds, Tantalum compounds, Niobates, Avalanche diodes, Communication theory.

MODULATION: Some considerations were made as to the configurations best suited for wide bandwidth light modulation using KTN. A configuration of special interest is one which takes advantage of the very low speed of propagation (and hence very short wavelengths) of microwave excitation in KTN. The use of KDP in traveling wave configurations is discussed. An experimental modulator is described. A 45 degree Z-cut KDP modulator was tested for its optical quality and found to be very nearly diffraction-limited. DEMODULATION: Recent experimental studies have suggested a particular photodiode structure which will yield microplasma free uniform bulk breakdown. The structure showing the most promise for microplasma free multiplication is the planar NP pi P structure. It is concluded that a well made diode at avalanche will always be photon shot-noise limited rather than thermal noise limited even at very low light levels. MODULATOR/DEMODULATOR SYSTEMS: A short discussion is given as to the conditions relating to television picture quality as transmitted, in the VHF region, over a laser beam. Examples of the kind of reception obtained are shown.

AD-614 724 Div. 25, 26

Westinghouse Research Labs., Pittsburgh, Pa.

EPITAXY IN THIN FILMS OF EuS,
by C. W. Chen and S. Zeitman. 21 Aug 64, 3p
Contract AF49 638 1245

Unclassified report

Pub. in Journal of Applied Physics (U. S.)
v36 n2 p669-70 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Single crystals, Epitaxial growth), (*Epitaxial growth, Films), (*Europium compounds, Sulfides), Vapor plating, Sublimination, Crystal structure, Electron diffraction analysis.

The excellent properties of EuS for epitaxial growth are reported. Under appropriate conditions, thin films that are essentially single crystalline were grown onto single-crystal substrates of certain crystal structures. During preliminary experiments, it was found that EuS sublimed without detectable decomposition at about 1700C in a vacuum of 0.00001 Torr. Single-crystalline films were subsequently grown epitaxially upon the (100) cleavage surface of single-crystal substrates of NaCl, NaBr, and MgO and upon the (111) cleavage surface of CaF2. Evidence for the (100) single-crystalline films is shown by the sharp spots in the electron-diffraction pattern. The use of Cu, Ge, Si, mica, and sapphire crystals, however, led to the formation of polycrystalline films only. Clearly, the crystal structure of the substrate is a critical criterion for the epitaxial growth. Besides the crystal structure of the substrate, another requirement for epitaxial growth is to heat the substrate at appropriate temperatures during deposition. An important characteristic of the epitaxial growth of EuS is the one-to-one correspondence in the growth mode. Experiments confirmed that (110) films of EuS can be grown upon artificially prepared (110) surfaces of CaF2 crystals. (Extracted).

AD-614 725 Div. 25

Naval Ordnance Test Station, China Lake, Calif.
FORM FOR THE RELATION BETWEEN STRESS AND FINITE ELASTIC AND PLASTIC STRAINS UNDER IMPULSIVE LOADING,
by Marvin E. Backman. 4 Feb 64, 12p
Rept. no. NOTS-TP-3720
Task RM042 004 216 1F008 08 06
NAVWEPS 8671

Unclassified report

Pub. in Journal of Applied Physics (U. S.) v35 n8 p2524-33 Aug 1964. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Loading (Mechanics), Impact shock), (*Strain (Mechanics), Impact shock), (*Impact shock, Loading (Mechanics), Materials, Deformation, Plasticity, Elasticity, Metals, Stresses, Explosions, Compressive properties, Mechanical waves, Propagation, Theory, Mathematical analysis, Shock (Mechanics).

The paper derives a form for the relation between stress and finite elastic and plastic strains. The finite elastic and plastic contributions to large deformation are defined assuming that these arise from distinct elastic and plastic mechanisms of deformation. This assumption is mathematically represented by distinct relations between elastic and plastic deformations and the state of stress. The choices for these relations are based on the theory of perfect elasticity and on the theory of quasistatic plasticity, but with modifications that permit the application to large strains and to dynamic situations. The expression for the dependence of the plastic deformation on the stress is explicitly strain-rate dependent. For simplicity the material is assumed to be isotropic. Constitutive relations are developed for the problem of one-dimensional stress-wave propagation. (Author)

AD-614 736 Div. 25, 2

California Inst. of Tech., Pasadena.
OSCILLATOR STRENGTHS FOR LINES OF FeI BETWEEN 2500 AND 3200 A,
by R. B. King, K. H. Olsen, and C. H. Corliss.
31 Aug 64, 11p
Contract Nonr22006

Unclassified report

Pub. in The Astrophysical Journal v141 n2 p354-63 Feb 15 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Iron, Absorption spectrum), (*Spectra (Visible and ultraviolet), Iron), Astrophysics, Atomic spectroscopy, Excitation, Oscillation, Ultraviolet spectroscopy.

Measurements of total absorption have been made for lines of Fe I excited in a graphite-tube furnace operated at various temperatures between 1600 and 3000K. Oscillator strengths derived from them are reported for 300 lines between 2500 and 3200 A. (Author)

AD-614 737 Div. 25

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MEASUREMENT OF AMPLITUDE NOISE IN OPTICAL CAVITY MASERS,
by Charles Freed and Hermann A. Haus. 6 Jan 65,
3p Rept. no. JA2510
Contract AF19 628 500

Unclassified report

Pub. in Applied Physics Letters v6 n5 p85-7 Mar 1 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Signal-to-noise ratio), Masers, Cavity resonators, Oscillators, Photoelectric effect.

Measurements are reported on the amplitude noise of a cavity-type gaseous optical maser oscillator operating at 6328 A above and below threshold. Results above threshold are compared with the theory of noise in Van der Pol oscillators, which is the proper one to use for the maser oscillator, and the measurement below threshold is compared with the linear theory of maser amplifiers. Because of the quantitative agreement it is concluded that the noise is due to spontaneous emission.

AD-614 738 Div. 25, 9

Cornell Univ., Ithaca, N. Y. Graduate School of Aerospace Engineering.
ALIGNED-FIELDS MAGNETOGASDYNAMIC WAKES,
by D. N. Fan. 8 May 64, 13p
Grant AF AFOSR62 201

Unclassified report

Pub. in Journal of Fluid Mechanics v20 pt3 p433-45 1964 (Copies available only to DDC users).
Revision of manuscript submitted 23 Dec 63.

Descriptors: (*Magnetohydrodynamics, Wake), (*Gas flow, Wake), Boundary layer, Equations, Two-dimensional flow, Diffusion, Incompressible flow, Compressive properties.

The effect of compressibility is included in a study of wakes created in two-dimensional, steady, aligned-fields, magnetogasdynamic flow past obstacles. The gas is assumed to be viscous, resistive, and thermally conducting. With the Oseen type of approximation as well as the magnetogasdynamic boundary-layer approximation, a great simplification in the formulation of wakes results. The boundary-layer equations, although linearized, still retain the coupling between the velocity, the magnetic, and the temperature fields. The solution of the magnetogasdynamic wake, in general, is a superposition of three individual-wake components, each satisfying a diffusion type of equation. Only one of them is capable of extending upstream. Hence the wake picture is generally characterized by a conventional downstream wake with also the possibility of the existence of an upstream one. To be sure, the general features of the magnetogasdynamic wakes in aligned-fields flows are similar to those of an incompressible fluid; however, the flow now, instead of just being subalfvenic, must be subcritical for the upstream wake to occur. (Author)

AD-614 748 Div. 25, 15

Chicago Univ., Illinois.
POST-NEWTONIAN EQUATIONS OF HYDRODYNAMICS AND THE STABILITY OF GASEOUS MASSES IN GENERAL RELATIVITY.
Technical rept.,
by S. Chandrasekhar. 25 Jan 65, 4p Unclassified report
Contract Nonr212124

Pub. in Physical Review Letters v14 n8 pB544 1-4-4 Feb 22 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrodynamics, Partial differential equations), (*Relativity theory, Hydrodynamics), (*Gases, Differential equations), Field theory, Perturbation theory, Integral equations, Tensor analysis.

AD-614 749 Div. 25

Northwestern Univ., Evanston, Ill. Technological Inst.
ON SECOND-ORDER THERMOELASTIC EFFECTS,
by George Herrmann. 2 Nov 63, 11p
Grant AF AFOSR100 63
AFOSR 65-0558
Unclassified report

Pub. in Zeitschrift fur Angewandte Mathematik und Physik v15 n3 p253-62 1964 (Copies available only to DDC users).

Descriptors: (*Thermal stresses, Elasticity), (*Elasticity, Thermal stresses), Shear stresses, Entropy, Strain (Mechanics), Thermodynamics, Equations of state.

AD-614 750 Div. 25

British Columbia Univ. (Vancouver).
INVESTIGATION OF RELAXATION OSCILLATIONS IN THERMISTOR-CAPACITOR SYSTEMS,
by G. A. Morley. 21 Sep 64, 14p
Grant DRB9512 22
Unclassified report

Pub. in Canadian Journal of Physics v43 p131-43 Jan 1965 (Copies available only to DDC users).

Descriptors: (*Thermistors, Capacitors), (*Relaxation oscillators, Thermistors), (*Capacitors, Thermistors), Resistance (Electrical), Thermal properties.

A thermistor displays negative resistance at low frequencies when biased with a current greater than turnover current, and when shunted by a capacitance in this condition, sustained oscillations are possible. The investigation involved a study of the dynamic properties of these oscillations and their relation to the static properties of the thermistor. The relevant thermistor parameters which were measured included the thermal time constant for which special very-low-frequency techniques were developed. The oscillations were studied over a wide range of capacitance covering the transition from sinusoidal to relaxational type. The voltage extrema and period were measured as functions of capacitance, voltage supply resistance, and operating point. An investigation was made of the features of the differential equations describing the behavior of the system, especially for limit cycles corresponding to relaxation oscillations. The asymptotic form of the cycles was derived for the case where the circuital time constant greatly exceeds the thermal time constant of the thermistor. The complicated nature of the equations precluded a solution in a closed form, and approximative methods were found to be necessary. However, in the case of sinusoidal oscillations of small amplitude, the period can be expressed exactly in terms of the system parameters and this result was confirmed experimentally. (Author)

AD-614 753 Div. 25

National Bureau of Standards, Washington, D. C.
ATOMIC LIFETIMES IN NEON I.
Revised ed.,
by J. Z. Klose. 8 Oct 64, 6p
Unclassified report

Pub. in Astrophysical Journal v141 n2 p814-8 Feb 15 1965 (Copies not available to DDC or Clearinghouse customers).
Supported by Proj. Defender and ARPA.

Descriptors: (*Neon, Electron transitions), (*Electron transitions, Neon), Excitation, Atomic spectroscopy, Astrophysics.

Mean lives of several excited states in Ne I were determined using a method of delayed coincidence. A pulsed beam of electrons is used to excite atoms of the gas. The excitation pulse also starts a time-to-pulse-height converter. Photons from the decay of the excited state pass through a monochromator and strike a photomultiplier. The ensuing pulse from the photomultiplier stops the time-to-pulse-height converter. The converter then feeds a voltage pulse proportional to the time between 'start' and 'stop' into a multichannel pulse-height analyzer. A distribution of decay times of the level of interest is thus built up in the analyzer. This distribution, which is ideally a pure exponential, is then used to determine the mean life of the level of interest.

AD-614 756 Div. 25

Westinghouse Research Labs., Pittsburgh, Pa.
EVIDENCE FOR IMPURITY BANDS IN La-DOPED EuS,
by R. R. Heikes and C. W. Chen. 15 Oct 64, 5p
Contract AF49 638 1245
Unclassified report

Pub. in Physics v1 n3 p159-62 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Semiconductors, Impurities), (*Atomic energy levels, Europium compounds), (*Sulfides, Europium compounds), (*Europium compounds,

Sulfides), Electrical conductance, Lanthanum, Ferromagnetic materials, Magnetic properties, Electrical properties, Crystal lattices, Cryogenics.

Experimental data are presented on the electrical conductivity of La-doped EuS. These and other data are discussed in terms of a model involving magnetization-dependent impurity banding. (Author)

AD-614 773 Div. 25
CFSTI Prices: HC$6.00 MF$1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
JOURNAL OF APPLIED MECHANICS AND TECHNICAL PHYSICS, 1963, NO. 5 (COLLECTION OF ARTICLES), 8 Feb 65, 277p FTD-MT-64-61
TT 65-62093 Unclassified report

Edited machine trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) n5 p1-160 1963. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Physics, Periodicals), (*Mechanics, Periodicals), Thermionic coverters, Electrical properties, Plasma physics, Ejectors (Fluid), Theory, Laminar flow, Thermal diffusion, Cavitation, Fracture (Mechanics), Mechanical waves, Rock (Geology), Explosion effects, Turbulance, Metal plates, Structural shells, Deformation, Creep, Magnetohydrodynamics, Buckling (Mechanics), Stresses, Materials, Plasticity, Pipes.

AD-614 779 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
THIN-FILM PREPARATION,
by Dietrich Dobischek and Stanley Cabell. Feb 65, 27p
Technical rept. no. ECOM-2573
Proj. 1P6 22001A055, Task 1P6 2001A055 01
Unclassified report

Descriptors: (*Films, Preparation), (*Vapor plating, Metal films), (*Tunneling (Electronics), Metal films), Vacuum apparatus, Sandwich construction, Oscillation, Anodes (Electrolytic cell), Oxidation, Quartz, Sandwich construction, Aluminum, Zinc compounds, Sulfides, Magnesium, Magnesium compounds, Aluminum compounds, Oxides, Gold, Evaporation.

Vacuum deposition techniques for the preparation of thin films were investigated and developed to a point where a study of the usefulness of these structures as tunnel emitters is now feasible. Experimentation with Al-ZnS-Al, Mg-MgO-Mg, and Al-Al2O3-Al structures will eventually lead to a study of the combination Al-A1203-Au sandwich, with special attention given to the method of forming the oxide film and to the geometry of the structure. A method of monitoring the thickness of thin films during deposition by means of an oscillating quartz crystal was investigated. Although the results proved promising, a decision on the final capabilities of this method cannot be made until calibration tests are completed and the reproducibility of the results is established. The usefulness of the electrolytical anodic oxidation technique for the preparation of thin insulating oxide layers was investigated. Preliminary experiments were conducted on various sheet metals. The investigation is presently concentrated on the oxidation of vacuum-deposited films of aluminum and the formation of special patterns using photoresist masking techniques. (Author)

AD-614 790 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Advanced Kinetics, Inc., Costa Mesa, Calif.
STUDIES ON THE INTERACTION OF LIGHT AND PARTICLE BEAMS.
Final technical rept. for 1 Aug 64-28 Feb 65.
5 Mar 65, 25p
Contract AF49 638 1359 Unclassified report
AFOSR 65-0492

Rept. includes: 'The Acceleration of Macroscopic Particles by Coherent Light Beams'; and 'Faraday Effect at Optical Frequencies in Strong Magnetic Fields' by R. W. Waniek, N. George, and S. W. Lee.

Descriptors: (*Particle beams, Light), (*Light, Particle beams), (*Magneto-optic effect, Lasers), (*Lasers, Particle beams), Acceleration, Magnetic fields, Evaporation, Field theory, Dynamics, Differential equations.

The Faraday effect at optical frequencies was investigated in magnetic fields up to 400,000 oersteds. The investigation has resulted in the determination of the Verdet coefficients for 10 optical media at lambda = 6328A. The experiment was conducted by means of a DC excited helium-neon laser operated in a hemispherical configuration and with transient magnetic fields provided by a 10 kilojoule bank. This investigation has established the practicality of optical rotators and switches of modest dimensions, low absorption, wide wavelength coverage extending into the far infrared. The effect of localized evaporation induced in minute particles by an impinging beam of coherent radiation has been calculated. The expected recoil velocities as generated by the beam pressure compounded by the evaporation process have been determined and the acceleration of the macroscopic particles was evaluated for a given duration of the vaporization process. Terminal velocities in excess of 100,000 cm/sec could be expected for masses of the order of 10 to the -11 power grams, or more, and diameters in the order of 10 to 100 microns with energy densities in the field of a few joules/cu cm.

AD-614 797 Div. 25, 14
CFSTI Prices: HC$1.00 MF$0.50

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
THE CRYSTAL STRUCTURE OF Bi2Ti4O11,
by Gunnar Jensen. Apr 65, 25p
Technical rept. no. TR-198
Contract Nonr184110, Proj. NR018 801 Unclassified report

Descriptors: (*Bismuth compounds, Titanates), (*Titanates, Crystal structure), (*Crystal structure, Bismuth compounds), (*Ceramic materials, Crystal structure), Dielectric materials, Phase studies, X-ray diffraction analysis, Crystal lattices, Anisotropy, Thermal properties.

The unit cell of the compound Bi2Ti4O11 is face-centered monoclinic and contains 4 formula units. Its space group is C 2/c with all atoms in general positions, except for oxygen atoms lying on twofold axes. A phase transition is observed at 250C, and the structure of the high-temperature modification is discussed. The unit cell of a related structure, probably stablized by impurities, is also reported. (Author)

AD-614 802 Div. 25
CFSTI Prices: HC$4.00 MF$1.00

National Engineering Science Co., Pasadena, Calif.

STUDY AND INVESTIGATION OF THE ANOMALOUS DISPERSION PHENOMENON IN CERTAIN MATERIALS TO DETERMINE ITS FEASIBILITY FOR USE IN A LASER SCANNER.
Final rept. for 12 Nov 63-27 Aug 64,
by Henry Hodara, Gerald Cline, J. Basinski, N. George, and C. Viswanathan. Mar 65, 143p SN-169
Contract AF30 602 3248, Proj. 5578, Task 557803
RADC TDR-64-467

Unclassified report

Descriptors: (*Beams (Electromagnetic), Deflection), (*Refractive index, Modulation), (*Lasers, Gas discharges), Scattering, Diffraction, Spectra (Infrared), Rare earth elements, Absorption, Ions, Light, Dielectric properties, Dyes, Helium, Neon, Display systems.

Anomalous Dispersion phenomena have been investigated as to their applicability to rapid deflection of laser beams. The deflection technique consists of varying the refractive index of a suitable material through a wavelength shift of its dispersion curve. Research on the feasibility of the technique has been carried out for the 6328 A CW gas lasers with the following target objectives: 30 K cps deflection rates, 1000 resolution elements, 10 degree deflection angle and less than 10% absorption loss. The results of the investigation show that beam deflection techniques by anomalous dispersion techniques are not practical at present because materials cannot be found that satisfy the conflicting requirements of high ionic density and oscillator strength and narrow linewidth. (Author)

AD-614 807 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Technical Operations Research, Burlington, Mass.
OPTICAL STUDIES OF PARTIALLY COHERENT DIFFRACTION AND THE ERGODIC HYPOTHESIS.
Final rept. for 15 Jul 64-15 Jan 65,
by George O. Reynolds and David G. Etsell.
30 Apr 65, 79p TO-B-65-13
Contract AF19 628 4320, Proj. 4600, Task 460006
AFCRL 65-152

Unclassified report

Descriptors: (*Light, Diffraction), (*Optics, Measure theory), (*Measure theory, Optics), Distortion, Illumination.

Diffraction by apertures illuminated by partially coherent light, diffraction by apertures containing random phase disturbances, experimental demonstration of the ergodic hypothesis, and the concept of cross spectral purity are considered. In diffraction experiments using partially coherent illumination, it is observed that as the ratio of aperture size to coherence interval increases (i.e., the illumination becomes less coherent) the sharp minima present in the diffraction pattern disappear and a shifting of the minima occurs. The results are compared with existing theories, and the agreement is excellent. It is experimentally shown that random phase disturbances placed in the diffracting aperture distort an individual diffraction pattern. In the corresponding ensemble-averaged experiment, the distortion is reduced and the diffraction pattern is more readily identified. A dynamical model of lycopodium particles suspended in water demonstrated the equivalence of time and ensemble averaging (ergodic hypothesis). The ensemble-averaged results agree quantitatively with theoretical calculations. In investigating the concept of cross spectral purity (J. Opt. Soc. Am. 51:1342 (1961)), it is shown that quasi monochromaticity is synonymous with spectral purity and that spectral impurity is synonymous with polychromaticity. (Author)

AD-614 808 Div. 25
CFSTI Prices: HC$4.00 MF$1.00

Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
SOME WAVE PROPAGATION PROBLEMS IN A BOUNDED, HETEROGENEOUS, ELASTIC MEDIUM. Thesis,
by Glenn Converse. Feb 65, 122p
Rept. no. SUDAER-216
Grants DA ARO D31 124G238, DA31 124ARO D223
AROD 4702:1

Unclassified report

Descriptors: (*Mechanical waves, Propagation), Solids, Spheres, Fluids, Flat plate models, Cylindrical bodies, Elasticity, Mathematical analysis.

This report is a study of the relationships existing between the frequency, phase velocity, group velocity, and wave number of mechanical waves propagating in bounded, heterogeneous, linearly elastic media. For single wave systems, which include the Love and pressure waves and are governed by a single second-order ordinary differential equation, Sturmian theory is applicable. Due to the inapplicability of Sturmian theory to two or three coupled, second-order ordinary differential equations, general results of double wave systems, comprised of the pressure and shear-vertical waves and described by these two or three equations, are unobtainable. The analysis is directed towards either very short or very long wavelength waves and proceeds by perturbation or asymptotic methods. For both wave systems, the emphasis is on determining the way in which the phase velocity varies with the wave number. From this relationship, the frequency and group velocity can be found as functions of the wave number.

AD-614 809 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Ohio State Univ. Research Foundation, Columbus.
N.M.R. STUDIES OF SOLIDIFIED H2 - D2 MIXTURES, I. STEADY-STATE EXPERIMENTS,
by J. R. Gaines, E. M. de Castro, and J. G. Daunt.
Apr 65, 48p Technical rept. no. TR-15
Contract Nonr49520, Projs. NR018 412, RF989

Unclassified report

Descriptors: (*Solidified gases, Nuclear magnetic resonance), (*Hydrogen, Nuclear magnetic resonance), (*Deuterium, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Solidified gases), Radiofrequency spectroscopy, Line spectrum, Transformations, Molecular properties, Cryogenics.

Steady state NMR measurements using a marginal oscillator technique at 10 Mc/sec were made on solid mixtures of nH2 - nD2 of nH2 concentration from 100% to 1% in the temperature range 1.1K to about 12K. Striking differences in the line shape were observed, particularly in the n-D2 rich sample, with change in temperature, the line shape at the lowest temperatures revealing a composite structure. The question whether this line shape transition is due to isotopic phase separation is discussed and this interpretation is considered unlikely. It is concluded that the transition is probably associated with a hindering of the rotation of the ortho-H2 molecule. Narrowing of the resonance lines with increasing r.f. power was observed. It is shown that no satisfactory explanation of this effect is possible using the Bloch equations. This narrowing is in excellent agreement with a recent calculation by Provotorov, however, and his theory is used to obtain a value of the

exchange interaction in solid H2 of approximately 10 to the -7th power K. The progressive saturation technique is used to obtain values of the product (T-1)(T-2) for several of the mixtures. The data showed that (T-1)(T-2) has a value of 4.2K of about 0.000002 sq. sec for concentrations of nH2 from 10% to 100%. (Author)

AD-614 826 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
A CRITICAL SURVEY OF THE METHODS FOR ANALYSIS OF SPHERICAL SHELLS,
by E. Y. W. Tsui and P. Stern. 1 Aug 63, 69p
Rept. no. 6-90-63-41
Unclassified report

Technical rept. on Solid Mechanics.

Descriptors: (*Structural shells, Analysis), Spheres, Bodies of revolution, Numerical analysis, Differential equations, Deformation.

This report presents the result of a survey of methods for analysis of spherical shells of uniform thickness that are subjected to axisymmetrical edge moments and forces. The methods fall into two main categories, namely Analytical analyses and Numerical analyses. Influence coefficients of arbitrary spherical segments for the practical range of shell parameters are evaluated by different methods and the results are compared. Also, the influence functions or internal influence coefficients that describe the variation of the meridional bending moments due to edge disturbances are given. Finally, the overall bending characteristics of spherical shells are discussed. (Author)

AD-614 839 Div. 25, 17
CFSTI Prices: HC$3.00 MF$0.75

Brigham Young Univ., Provo, Utah. Dept. of Physics.
DIFFUSION IN METALS AT ULTRA-HIGH PRESSURES.
Final rept.,
by D. L. Decker and H. B. Vanfleet. 1 Mar 65, 56p
Grant AF AFOSR201 63
AFOSR 65-0580
Unclassified report

Descriptors: (*Metals, Diffusion), (*Diffusion, Metals), High-pressure research, Silver, Wire, Heat treatment, Quenching (Cooling), Gold, Lead, Resistence (Electrical), Heat of activiation, Crystal lattice defects, Heat of formation.

Silver wires 3 mil in diameter have been quenched from temperatures between 500 and 1000 C to room temperatures for pressures up to 30 kbar. Upon quenching, an increase in room temperature resistance was measured, but 90% of this increase was permanent and remained even after high temperature anneals. The increase in resistance could therefore not be correlated directly with vacancy formation. Because of the uncertainty in explaining the results it was not possible to obtain meaningful activation energies or volumes from the measurements. The diffusion of silver into lead has been investigated using radioactive tracer techniques in a temperature range within 200 C of the melting point of lead for six pressures between zero and 40 kbar. The activation energy was found to increase from 15.2 to 21.9 ± .3 kcal/mole as the pressure increased from atmospheric to 39.2 kbar. The activation volume for pressures below 11.9 kbar ranged from .54 ± .06 to .48 ± .05 atomic volumes as the temperature decreased from 769 to 556 K. Above 11.9 kbar the activation volume was nearly constant at .38 ± .03 atomic volumes over the same temperature interval. As a result of the large decrease in the activation volume that occurs between zero and 11.9 kbar it is suggested that the diffusion process for silver into lead changes from a composite of interstitial plus vacancy to an interstitial mechanism. (Author)

AD-614 842 Div. 25, 26
CFSTI Prices: HC$1.00 MF$0.50

Michigan Technological Univ., Houghton, Mich. Dept. of Metallurgy.
DEFECT BEHAVIOR IN PLASTICALLY DEFORMED SEMICONDUCTORS.
Final rept.,
by L. A. Heldt. 17 Mar 65, 6p
Grant AF AFOSR62 290, Proj. 9763, Task 976301
AFOSR 65-0663
Unclassified report
Research to continue under Grant AF AFOSR846 65.

Descriptors: (*Crystal lattice defects, Semiconductors), (*Semiconductors, Deformation), Stresses, Germanium, Antimony, Diffusion, Single crystals, Crystal growth, Creep, Tensile properties, Heat treatment, Impurities.

This research is concerned with the behavior of defects during plastic deformation and the relation of this behavior to observed plastic properties. The experimental program is concerned with the semiconductor elements, for which rather direct means of investigation are applicable. The study involves carefully controlled determinations of the plastic properties of material deformed under constant stress. The effects of: (1) heavy doping (2) specimen orientation and type of deformation and (3) an impurity precipitated along the dislocation lines, are measured in order to determine the relation of dislocation motion to the production of point defects, the effect of the density of dislocation intersections on dislocation motion, and the effects of an impurity precipitated along dislocation lines upon dislocation motion. (Author)

AD-614 846 Div. 25

Philipps-Universitat, Marburg (West Germany). Inst. fur Theoretische Physik.
ATTEMPT OF AN AXIOMATIC FOUNDATION OF QUANTUM MECHANICS AND MORE GENERAL PHYSICAL THEORIES,
by Gunther Ludwig. 1964, 46p
Contract AF61 052 658
AFOSR 65-0646
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Quantum mechanics, Theory), (*Mathematical logic, Quantum mechanics), Functional analysis, Field theory, Physics, West Germany, Probability.

By introducing certain axiomatic assumptions on the production of macroscopic effects by microscopic objects it is tried to obtain a general basic structure of physical theories. The essential features of the proposition-calculus of quantum mechanics are reproduced though it has not yet been possible to give a complete survey of mathematical realizations which might satisfy the postulates. (Author)

AD-614 848 Div. 25, 14

Rose Polytechnic Inst., Terre Haute, Ind. Physics Dept.

A STUDY OF RESONANT ABSORBERS FOR UNDERWATER SOUND.
Terminal rept.,
by Wilkison Meeks. Jan 65, 50p
Contract Nonr325501

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Underwater sound, Acoustic insulation), (*Acoustic insulation, Rubber coatings), Porous materials, Sound, Absorption, Acoustic impedance, Membranes, Models (Simulations), Theory, Acoustics.

In the first part of the work a simple model of a resonant absorber is proposed from which is derived an expression relating the acoustic impedance at the surface of the absorber with the dynamic modulus of the material from which it is made. Results are presented of measurements of the impedance and dynamic moduli of resonant absorber samples having rectangularly shaped holes, to which the model presumably applies. In Part II a theoretical study is made of a resonant absorber consisting of a thin rubber membrane cemented or clamped over a metal disc in which circular holes have been bored. An expression for the specific acoustic admittance of this membrane type absorber is derived in terms of the tension in the membrane, the surface density, the damping constant, the radius of the holes, the number of holes per unit area, and the mass and thickness of the disc. The anechoic properties of such a surface is investigated for various values of the different parameters involved. Experimental procedures and apparatus used for the various measurements are also presented.

AD-614 851 Div. 25, 17

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
ULTRASONIC AND THERMAL BEHAVIOR OF Nb-25% Zr IN STRONG MAGNETIC FIELDS,
by L. J. Neuringer and Y. Shapira. 2 Oct 64, 4p
Contract AF19 604 7344
AFOSR 65-0732

Unclassified report

Pub. in Solid State Communications v2 p349-51 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Niobium alloys, Zirconium alloys), (*Thermal properties, Niobium alloys), (*Ultrasonic properties, Niobium alloys), (*Shear stresses, Magnetic fields), Cryogenics, Ultrasonic radiation, Magnetic properties, Attenuation.

An absorption edge for ultrasonic shear waves was observed at the upper critical field of Nb-25% Zr. The temperature variation of the field at which this edge occurs was compared with several theoretical models. (Author)

AD-614 852 Div. 25, 4

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
ANALYSIS OF THE EIGENSTATES OF Pr(3+) IN LaCl3 USING THE ZEEMAN EFFECT IN HIGH FIELDS,
by R. Sarup and M. H. Crozier. 17 Sep 64, 6p
Contract AF19 604 7344
AFOSR 65-0734

Unclassified report

Pub. in Journal of Chemical Physics v42 n1 p371-6 1 Jan 65 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Praseodymium, Atomic energy levels), (*Lanthanum compounds, Chlorides), (*Line spectrum, Praseodymium), Ions, Absorption spectrum, Fluorescence, Cryogenics, Magnetic fields, Crystal lattices, Field theory, Hamiltonian, Dipole moments.

The Zeeman effect of the absorption and fluorescence spectra of Pr(3+) in LaCl3 was studied at liquid nitrogen and liquid helium temperatures in magnetic fields up to 69 kG. Both linear and quadratic effects were observed, and these are used to establish unequivocally the crystal quantum numbers of the observed energy levels. Crystal-field theory is used to calculate the magnetic behavior of the energy levels, and good agreement is found with experiment, but some systematic deviations are also noted. The second-order effect was found useful in understanding the nature of these deviations, and it appears that a crystal-field calculation fitted to the energy levels does not yield the eigenstates giving the best agreement with the observed behavior in high magnetic fields. (Author)

AD-614 853 Div. 25

Amherst Coll., Mass.
HYPERFINE SPECIFIC HEAT OF URANIUM METAL,
by C. W. Dempesy, J. E. Gordon, and R. H. Romer.
28 Oct 63, 3p
Grant NSF G17569

Unclassified report

Pub. in Physical Review Letters (U. S.) v11 n12 p547-9 Dec 15 1963 (Copies not available to DDC or Clearinghouse customers)
Prepared in cooperation with Brookhaven National Lab., Upton, N. Y.

Descriptors: (*Uranium, Specific heat), Cryogenics, Measurement, Hyperfine structure.

Measurements were made of the specific heats of U(235) and U(238) metals below 0.75K. Results show a large T(-2) contribution to the specific heat of U(235), whereas the corresponding term in the U(238) data is almost negligible. This indicates the presence of a large hyperfine interaction in U(235).

AD-614 859 Div. 25

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ON THE SYMMETRY OF SPIN CONFIGURATIONS IN MAGNETIC CRYSTALS,
by J. O. Dimmock. 1964, 4p Rept. no. MS-1010
Contract AF19 628 500

Unclassified report

Reprint of a Meeting Speech.

Descriptors: (*Magnetic materials, Nuclear spins), (*Nuclear spins, Magnetic materials), (*Molybdenum compounds, Sulfides), (*Iron compounds, Oxides), Crystal lattices, Phase studies, Quantum mechanics, Field theory, Vector analysis.

The use of symmetry in the determination of spin configurations in magnetic crystals is discussed. The Landau-Lifshitz theory of the change of symmetry in a second order phase transition is reviewed and compared with the work of Bertaut and of Kaplan et al. The Landau-Lifshitz theory is illustrated by application to zinc blende beta-MnS. With the available neutron diffraction results it predicts uniquely the spiral structure previously proposed by Keffer on other grounds. The theory is also applied to the high temperature phase of alpha-Fe2O3 where it is em-

phasized that the method is not restricted to models of the spin configuration consisting of spins fixed on the magnetic ion sites, but is capable of describing a spin density which is a general function of position. The spin density obtained is consistent with the neutron diffraction results of Pickart, Nathans and Alperin and with the theoretical spin density calculated for this material by Kaplan. It is noted that the theory is not applicable to the low temperature phase of alpha-Fe2O3. (Author)

AD-614 861 Div. 25, 30

Lockheed Missiles and Space Co., Sunnyvale, Calif.
MAGNETOSTATIC MODE ECHO IN FERROMAGNETIC RESONANCE,
by D. E. Kaplan. 18 Jan 65, 7p
Technical rept. no. TR-5
Contract Nonr254100, Proj. NR048 125
Unclassified report

Pub. in Physical Review Letters (U. S.) v14 n8 pB514 1-3-3 Feb 22 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetic resonance, Ferromagnetic materials), (*Ferromagnetic materials, Magnetic resonance), Yttrium compounds, Iron compounds, Garnet, Single crystals, Excitation, Radiofrequency power, Relaxation time, Delay lines, Computer storage devices.

The observation of echo phenomena in ferromagnetic resonance analogous to the paramagnetic spin echo is reported. The effect, observed in yttrium iron garnet single-crystal samples, arises from simultaneous excitation of a large number of magnetostatic modes by application of microwave pulses. Experimental results are reported and a brief theoretical treatment is sketched. (Author)

AD-614 862 Div. 25, 15

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
ONE-DIMENSIONAL EQUATION FOR A TWO-DIMENSIONAL BLOCH ELECTRON IN A MAGNETIC FIELD,
by J. Zak. 24 Jul 64, 3p
Contract AF19 604 7344 Unclassified report
AFOSR 65-0731
Pub. in Physical Review (U. S.) v136 n6A pA1647-9 Dec 14 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electrons, Dynamics), (*Magnetic fields, Electrons), (*Differential equations, Difference equations), Potential theory, Quantum mechanics, Hamiltonian.

The properties of the symmetry-adapted functions for the irreducible representations of the magnetic translation group are used to derive a one-dimensional difference-differential equation for a two-dimensional Bloch electron in a constant magnetic field. (Author)

AD-614 870 Div. 25

Lincoln Lab., Mass. Inst. of Tech., Lexington.
X-BAND MODULATION OF GaAs LASERS,
by B. S. Goldstein and R. M. Weigand. 28 Dec 64, 1p
Unclassified report

Pub. in Proceedings of the IEEE v53 n2 p195 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Amplitude modulation), X band, Diodes (Semiconductor), Gallium alloys, Arsenic alloys, Injection, Traveling-wave tubes, Coupling circuits, Radiofrequency power.

This correspondence reports CW amplitude modulation of GaAs injection lasers at X band. The highest modulation frequency was 11 Gc/s, a limit imposed by components of the experimental setup. The X-band modulating signal is amplified in a traveling-wave amplifier and coupled to the laser. Two directional couplers monitor the forward and reflected RF power. The RF power is coupled to the laser in a waveguide structure. In this structure, the copper fins act as a short circuit to the X-band power while the modulated infrared radiation passes unaffected (neglecting some blockage). The laser, located between two sections of a copper post, is spaced a half guide wavelength (at 9.1 Gc/s) from the RF short-circuiting fins.

AD-614 876 Div. 25, 4

Washington Univ., St. Louis, Mo. Dept. of Physics.
CONVERSION OF ION TYPES IN NITROGEN,
by Shien-Biau Woo. 20 Aug 64, 11p
AROD 2802:12
Unclassified report

Research supported by Army Research Office, Durham, N. C.
Pub. in Journal of Chemical Physics v42 n4 p1251-61 Feb 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nitrogen, Ions), (*Gas ionization, Nitrogen), Reaction kinetics, Chemical equilibrium, Electric fields, Pressure, Mass spectrum, Ion sources.

A single-shutter drift tube, together with a hot-filament-type ion source, was used to investigate the conversion and drift properties of ions in nitrogen. Three different species of ions, namely N(+), N2(+), and N3(+), were detected, and their drift velocities in nitrogen were measured over a range of E/p (ratio of electric field strength to pressure) from 10 to 200 V/(cm.mm Hg). N2(+) was found to undergo time-rate-controlled conversion to N3(+). Theoretical solutions of such a drift transient were obtained and were compared with experiment. The attachment frequency was deduced from the transient form, and its dependence on pressure and E/p measured. (Author)

AD-614 880 Div. 25, 8

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ELECTROMAGNETIC MODE MIXING IN NONLINEAR MEDIA.
Revised ed.,
by R. H. Kingston and A. L. McWhorter. 26 Oct 64 10p
Unclassified report

Pub. in PROCEEDINGS OF THE IEEE v53 n1 p4-12 Jan 1965. (Copies not available to DDC or Clearinghouse customers).
Revision of manuscript submitted 10 Sep 64.

Descriptors: (*Lasers, Electromagnetic waves), (*Electromagnetic waves, Perturbation theory), Frequency, Resonance, Harmonic oscillators, Dielectrics, Magnetic fields, Nonlinear systems, Tensor analysis, Cavity resonators, Propagation, Parametric amplifiers.

A general theory of the coupling of electromagnetic modes in a nonlinear dielectric or magnetic medium is developed. The rate at which the mode amplitudes change, either in time or in space, is derived by a perturbation method similar to that previously used for stationary perturbations. The technique is illustrated by applying it to the problems of producing harmonic generation and parametric oscillation with a high-power laser, confocal resonator modes being used to describe mathematically both the focused laser beam and the output radiation. A comparison is made of resonant vs nonresonant structures for second harmonic generation, and threshold conditions are obtained for parametric oscillation. In addition, by combining the Manley-Rowe relations with the coupled mode equations, an alternative derivation of the symmetry properties of the nonlinear susceptibility tensor is given. (Author)

AD-614 881 Div. 25, 17, 30

National Research Council of Canada, Ottawa (Ontario). Div. of Applied Chemistry.
THE DESIGN OF A LOW TEMPERATURE THERMOCOUPLE MATERIAL,
by R. S. Crisp and W. G. Henry. 8 Jun 64, 4p
Unclassified report

Pub. in Cryogenics p361-4 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Thermocouples, Alloys), (*Alloys, Thermocouples), Silver alloys, Gallium alloys, Copper alloys, Gold alloys, Thermoelectricity, Cryogenics, Low-temperature research, Thermal conductivity, Voltage, Canada.

The paper presents factors pertinent to the development of a passive element of good reproducibility in the temperature region below 300K, with a positive thermopower in the liquid helium range. A silver-gallium alloy containing approximately 4.8% (at.) gallium was found to have properties desirable for use in thermocouples and also suitable for use as a thermoelectric standard material.

AD-614 891 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

General Dynamics/Electronics, Rochester, N. Y. Physical Electronics Lab.
THIN FILM MEASUREMENT TECHNIQUES.
Final rept. for Jul 63-Aug 64,
by Carl E. Drumheller. Dec 64, 78p
Contract AF33 657 8753, Task 415003
AL TR-64-288
Unclassified report

Descriptors: (*Films, Measurement), (*Photoelectric effect, Measurement), (*Tunneling (Electronics), Aluminum compounds), (*Diodes (Semiconductor), Aluminum compounds), Oxides, Crystal lattice defects, Electric currents, Voltage, Electrical properties, Optical properties, Anodes, Luminescence, Dielectric films, Copper, Bismuth, Metal films, Ceramic materials.

An advance in the current density measurement of electron tunneling in aluminum oxide has been made. The structure under study is an Al-Al2O3-Al thin-film diode. In these devices a current density measure of 242 amp/sq cm has resulted from modifications in measurement technique. Previously reported voltage-current and temperature-conductivity measurements support the belief that this tunnel current is due to the presence of traps. Recent photoemission measurements have strengthened this belief. Some properties of anode luminescence in aluminum oxide have been observed. Electrical and optical properties of thin-film copper have been investigated and have supplemented similar work with bismuth films. The anomalous result obtained for copper, that transmittance of radiation is greater for the thicker film than for the thinner film, is a further confirmation of the tunneling model for grain-boundary scattering in polycrystalline metal films. The photoemission measurements, quantum tunneling calculations, the anode luminescence study of aluminum oxide, the optical measurements of thin polycrystalline copper films, and a charge versus voltage display are discussed. (Author)

AD-614 909 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Delaware Univ., Newark. Dept. of Physics.
LAYERLIKE FIELD INHOMOGENEITIES IN HOMOGENEOUS SEMICONDUCTORS IN THE RANGE OF 'NEGATIVE DIFFERENTIAL CONDUCTIVITY',
by K. W. Boer. 1964, 40p
Contract Nonr433600
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Semiconductors, Field theory), (*Cadmium compounds, Sulfides), Electrical conductance, Electrons, Partial differential equations, Integral equations, Mathematical models, Electric currents, Photoelectric effect, Infrared radiation, Single crystals.

Characteristic layerlike field inhomogeneities are shown to occur in homogeneous semiconductors if the decrease in conductivity is stronger than linear with increasing field, and are discussed under a general aspect in a model using Poisson- and transport-equations and the fact that the neutral density of electrons and/or the mobility decreases with increasing field strength. The method of characteristics is used for discussion and permits an analysis of the experimental observations easily. Further experimental results about layerlike field inhomogeneities in CdS concerning domain-width and field strengths, influence of optical excitation and quenching, and net charging of CdS crystals are given and show good agreement with the proposed theory. (Author)

AD-614 923 Div. 25, 30
CFSTI Prices: HC$1.00 MF$0.50

Plasma Physics Research Lab., Univ. of Minnesota, Minneapolis.
STUDY OF COLLISION PROCESSES IN GASEOUS PLASMAS.
Semi-Annual technical rept. no. 3, Jul 64-Jan 65,
ed. by H. J. Oskam. Mar 65, 18p
Contract Nonr71037
Unclassified report

See also AD-434 786.

Descriptors: (*Plasma medium, Test equipment), Electrons, Density, Ions, Atoms, Molecules, Line spectrum, Band spectrum, Probes (Electromagnetic), Mass spectroscopy, Spectrum analyzers, Electronic equipment, Gas discharges.

The major portion of the report is comprised of a detailed description of the SLEMA II (Simultaneous Light Emission, Absorption and Mass Analysis) measuring

system. The system is designed to measure simultaneously on the same gaseous plasma the time dependence of the number density of electrons, positive and negative ions, and metastable atoms and molecules, while also the intensity of spectral lines and bands can be determined. Summaries are given of results obtained with the SLEMA I system and of a redesign of the auxilliary electronics for an ion mobility measuring tube.

AD-614 930 Div. 25, 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
PROBABILITY AND QUANTUM MECHANICS,
by Stanley Gudder. Mar 65, 14p
Technical summary rept. no. MRC-TSR-551
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Quantum mechanics, Probability), (*Probability, Quantum mechanics), Functional analysis, Mathematical logic, Algebra.

A direct comparison between the conventional probability theory and the propositional calculus of quantum mechanics is given. The physical significance of certain terms used is given and it is hoped that a clearer and more unified picture of the theory is developed. (Author)

AD-614 947 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PACIFICATION OF FIRE,
by V. Golovachev. 13 Apr 65, 7p
FTD-TT-64-1107
TT 65-62136

Unclassified report

Unedited rough draft trans. from Pravda, Moscow (USSR) p4 Jul 17 1962.

Descriptors: (*Plasma engines, Energy conversion), (*Energy conversion, Plasma engines), Magnetohydrodynamics, USSR.

The development of plasma engines in the Soviet Union is briefly reviewed.

AD-614 953 Div. 25, 17
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CRYSTAL STRUCTURE OF Sr6Li23 COMPOUND,
by P. I. Kryp'yakevych and H. I. Oleksiv.
15 Apr 65, 6p FTD-TT-64-1145
TT 65-62142

Unclassified report

Unedited rough draft trans. of Akademiya Nauk URSR Kiev. Dopovidi n11 p1489-91 1963.

Descriptors: (*Lithium alloys, Crystal structure), (*Strontium alloys, Lithium alloys), (*Crystal structure, Lithium alloys), Crystal lattices, Intermetallic compounds, X-ray diffraction analysis.

X-ray diffraction analysis was used to establish the existence of the compound Sr6Li23 (Th6Mn23 type, a = 15.05 A). (Author)

AD-614 954 Div. 25, 9
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
LIQUID SUSPENSIONS AS HEAT-TRANSFER AGENTS,
by V. I. Kofanov. 13 Apr 65, 13p
FTD-TT-64-1147
TT 65-62143

Unclassified report

Unedited rough draft trans. of Energomashinostroenie (USSR) v10 n1 p41-3 1964.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Heat transfer, Colloids), (*Colloids, Heat transfer), Liquids, Turbulence, Pipes, Thermodynamics, Fluid mechanics, USSR.

An exposition is given of the dependences for the analysis of heat emission and hydraulic resistance of liquid suspensions in a turbulent flow in tubes as well as a comparison of the properties of liquid suspensions and liquid when they are used as heat-transfer agents. (Author)

AD-614 955 Div. 25, 4, 14
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
X-RAY ANALYSIS OF THORIUM TUNGSTATE AND THORIUM MOLYBDATE,
by V. K. Trunov and L. M. Kovba. 15 Apr 65, 7p
FTD-TT-64-1151
TT 65-62144

Unclassified report

Unedited rough draft trans. of Moscow Univ. Vestnik. Seriya 2: Khimiya (USSR) v19 n3 p60-3 1963.

Descriptors: (*Thorium compounds, Ceramic materials), (*Tungstates, Thorium compounds), (*Molybdates, Thorium compounds), X-ray diffraction analysis, Crystal structure, Phase studies, Crystal lattices.

An X-ray analysis was made of molybdate and tungstate of thorium. Mixtures of stoichiometric amounts of original oxides were roasted at temperatures of 750 to 1,000C. The X-ray pictures of the specimens, were done on CuK sub a radiation in the Guignet focusing camera with a curved single crystal of Ge as a monochromator. By the method of X-ray-phase analysis, there was established the existence only of Th(Mo04)2 and Th(W04)2.

AD-614 956 Div. 25, 20
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CHANGE IN ELECTROCONDUCTION OF VITREOUS SEMICONDUCTORS (T1AsSe2; T1AsSe4; As4Se3Te3 AND As2Se2Te) IN DEPENDENCE UPON THE MAGNITUDE OF INTEGRAL DOSAGE OF GAMMA-RADIATION,
by A. N. Bobrova and E. M. Lobanov. 13 Apr 65, 9p
FTD-TT-64-1166
TT 65-62145

Unclassified report

Unedited rough draft trans. of mono. Radiatsionnye Effekty Tverdykh Telakh (Radiation Effects in Solids) Tashkent, 1963, p45-9.

Descriptors: (*Semiconductors, Radiation damage), (*Radiation damage, Semiconductors), Glass, Thallium compounds, Arsenic compounds, Selenides, Tellurides, Gamma rays, Electrical conductance, Photoelectric effect, USSR.

The dependence of electrical conductance on the integral dosage of gamma radiation is reported for the following vitreous semiconductors: TlSe.As2Se3, As2Se3.As2Te3, and 2As2Se3.As2Se3.

AD-614 972 Div. 25, 15

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
AN APPLICATION OF PERTURBATION THEORY TO THE NON-HOMOGENEOUS ELASTIC THICK-WALLED TUBE,
by W. R. Spillers. Jun 61, 7p
Technical rept. no. TR-3, CU-3-61-ONR266 (78) CE
Contract Nonr26678
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not availalble for public sale.

Descriptors: (*Elastic shells, Stresses), (*Stresses, Elastic shells), (*Perturbation theory, Elastic shells), Deformation, Cylindrical bodies, Elasticity, Differential equations, Power series, Boundary value problems.

An application is presented of perturbation theory to the determination of stresses and displacements in an axially symmetric, non-homogeneous thick-walled tube inside a thin shell. There is no criteria for the order of the perturbation, but the solution is asymptotic in the sense that for zero perturbation it is exact. The usefullness of the method in the past has been in the fact that it gives accurate results for rather 'large' perturbation. The accuracy of the results obtained here is discussed by comparing them to rigorous known solutions.

AD-614 973 Div. 25, 15
CFSTI Prices: HC$3.00 MF$0.75

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
NON-UNIFORM SHRINKAGE IN CASE-BONDED VISCO-ELASTIC HOLLOW CYLINDER OF INFINITE LENGTH,
by A. S. Cakmak. Jun 61, 57p
Technical rept. no. TR-4, CU-4-61-ONR266 (78) CE
Contract Nonr26678
Unclassified repo1

Descriptors: (*Cylindrical bodies, Deformation), (*Viscoelasticity, Cylindrical bodies), (*Elastic shells, Viscoelasticity), Thermal stresses, Bonding, Strain (Mechanics), Elasticity, Integral transforms, Boundary value problems.

The effect of non-uniform shrinkage (or swelling) on stresses and displacements in a thick-walled cylinder of visco-elastic material is discussed. The cylinder is assumed to be of infinite length, reducing the problem to one of plane strain. The cylinder is contained in a rigid case, resulting in zero circumferential and radial displacement components at the outer face, while the inner face is free of tractions. Use is made of the analogy between shrinkage (swelling) and temperature distribution in the body. While assuming the space distribution to be arbitrary, the time distribution is exponential, with the cooling (heating) rate as a parameter. The purpose of the analysis is to establish, in first approximation, the intensity of the circumferential and radial stresses in the cylinder and on the interface between cylinder and case for a specific realistic assumption concerning the visco-elastic response and various assumptions concerning the space distribution of shrinkage and several values of the cooling rate.

AD-614 974 Div. 25, 15
CFSTI Prices: HC$2.00 MF$0.50

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
SHRINKAGE STRESSES IN CASE-BONDED HOLLOW CYLINDER CONSISTING OF TWO VISCO-ELASTIC LAYERS OF DIFFERENT PROPERTIES,
by A. M. Freudenthal and M. Shinozuka. Jul 61, 27p Technical rept. no. TR-5, CU-5-61-ONR266(78) CE
Contract Nonr26678
Unclassified report

Descriptors: (*Cylindrical bodies, Deformation), (*Viscoelasticity, Cylindrical bodies), (*Elasticity, Viscoelasticity), Stresses, Strain (Mechanics), Bonding, Boundary value problems.

Stresses and strains are considered in an elastic-case bonded thick-walled cylinder of infinite length which consists of two layers of visco-elastic material of different properties subject to spontaneous shrinkage or swelling.

AD-614 975 Div. 25, 15, 30

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
ANALYSIS OF AN ANISOTROPIC NONHOMOGENEOUS HOLLOW CYLINDER,
by A. M. Freudenthal and W. R. Spillers. Jul 61, 46p Technical rept. no. TR-6, CU-6-61-ONR 266 (78) CE
Contract Nonr26678 Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Cylindrical bodies, Stresses), (*Stresses, Elastic shells), Strain mechanics, Differential equations, Propellant grains. Digital computers, Programming (Computers).

Some elementary solutions of the stress and strain problem of anisotropic and nonhomogeneous hollow cylinders are reviewed. The assumptions are made that the material is linearly elastic and the strains infinitesimal. Moreover, all problems dealt with in this note are considered as plane strain problems with axial symmetry. Problems of this type are encountered in the design and analysis of solid propellant grains with circumferential reinforcement of arbitrary nature and distribution along the radius, subject to short-time internal pressure for which the assumption of elasticity is tolerable as a first approximation.

AD-614 976 Div. 25, 15
CFSTI Prices: HC$1.00 MF$0.50

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
A SERIES SOLUTION OF THICK-WALLED ELASTIC NON-HOMOGENEOUS HOLLOW CYLINDER SUBJECT TO SHRINKAGE,
by M. Shinozuka. Aug 61, 20p
Technical rept. no. TR-7, CU-7-61-ONR 266(78) CE
Contract Nonr26678 Unclassified report

Descriptors: (*Cylindrical bodies, Deformation), (*Elastic shells, Differential equations), (*Series, Differential equations), Elasticity, Shear stresses, Viscoelasticity, Stresses, Strain (Mechanics).

A series solution of a thick-walled hollow cylinder of infinite length with non-homogeneous elastic property subject to spontaneous shrinkage is given. The non-homogeneity is assumed here so that the shear modulus is a function of r to the qth power (q = 1, 2, ---) while the bulk modulus K = constant. (Author)

AD-614 977 Div. 25, 15
CFSTI Prices: HC$1.00 MF$0.50

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
SHRINKAGE STRESSES IN A CASE-BONDED HOLLOW CYLINDER OF NON-HOMOGENEOUS VISCO-ELASTIC PROPERTIES,
by M. Shinozuka. Sep 61, 22p
Technical rept. no. TR-8, CU-8-61-ONR 266(78) CE
Contract Nonr26678

Unclassified report

Descriptors: (*Cylindrical bodies, Deformation), (*Elastic shells, Viscoelasticity), (*Viscoelasticity, Cylindrical bodies), Stresses, Strain (Mechanics), Elasticity, Series, Integrals, Bonding.

A general discussion of the elastic-viscoelastic analogy for a viscoelastic material exhibiting non-homogeneity is presented with emphasis on its applicability to a non-homogeneous visco-elastic hollow cylinder of infinite length subject to spontaneous shrinkage of the material. The assumed mechanical response consists of a standard solid for deviatoric and an elastic medium for volumetric deformation. As an example of non-homogeneity, a material is considered for which the visco-elastic operators G and K are such that G = L + M(r/a) to the qth power (r = radius) while K is constant. The elastic-viscoelastic analogy is applied with the aid of a series solution of the associated elastic problem obtained in the previous report. Numerical results are given for the case q = 1, introducing an approximation for the evaluation of the inversion integral of the transformed solution. (Author)

AD-614 978 Div. 25, 15
CFSTI Prices: HC$1.00 MF$0.50

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
ORTHOTROPIC VISCOELASTIC THICK-WALLED TUBE,
by W. R. Spillers. Sep 61, 12p
Technical rept. no. TR-9, CU-9-61-ONR 266(78) CE
Contract Nonr26678

Unclassified report

Descriptors: (*Cylindrical bodies, Strain (Mechanics)), (*Viscoelasticity, Cylindrical bodies), (*Compressive properties, Elastic shells), Elasticity, Boundary value problems, Stresses, Series, Integral transform.

The orthotropic viscoelastic thick-walled tube in plane strain is discussed. The simplifications which arise for this problem when the material is incompressible are examined.

AD-614 981 Div. 25, 30

Pitman-Dunn Inst. for Research, Frankford Arsenal, Philadelphia, Pa.
OPTICAL METHOD FOR ULTRASONIC WAVEFORM ANALYSIS, USING A RECURSION RELATION.
Technical research article,
by Bill D. Cook. 6 Oct 64, 6p
Rept. no. A65-2
Proj. 1C014501B11A

Unclassified report

Pub. in Journal of Acoustical Society of America (U. S.) v37 n1 p172-3 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ultrasonic radiation, Optical analysis), Optical instruments, Wave analyzers, Harmonic analyzers, Monochromatic light, Diffraction, Intensity, Mathematical analysis, Simultaneous equations, Mathematical logic, Phase modulation, Theory.

The intensity distribution of light diffracted by progressive ultrasonic waves is used to find the harmonic structure of these waves. A recursion relation has been found that permits the calculation of the harmonic structure from a set of simultaneous linear equations. The coefficients of these equations are obtained from measurement of the diffraction orders. (Author)

AD-614 986 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Tyco Labs., Inc., Waltham, Mass.
STUDY OF SURFACE STATES IN SEMICONDUCTORS.
Quarterly rept. no. 6, 5 Sep-4 Dec 64,
by G. Rupprecht and P. H. Smakula. Apr 65, 33p
Contract AF30 602 3157, Proj. 760E, 5519,
Task 551906
RADC TR-65-6

Unclassified report

See also AD-612 051.

Descriptors: (*Semiconductors, Surface properties), Silicon, Silicon compounds, Oxides, Oxidation, Electrical properties, Probes (Electromagnetic), Graphics.

Surface states on silicon oxidized by both thermal and anodic growth have been studied by two complementary experimental techniques - the pulsed field effect, and capacity measurements over a wide range of frequency and temperature. The two have revealed similar surface levels, and have led to the following conclusions: anodic oxidation creates an inversion layer on N-type silicon, which can be removed by heat treatment; and thermal oxidation leads to increased dislocation density, and results in reduction of the surface state density. (Author)

AD-614 998 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Institute of Optics, Univ. of Rochester, N. Y.
A STUDY OF THE WAVE INTERACTION BETWEEN LIGHT BEAMS HAVING LARGE PATH DIFFERENCE.
Final rept. for 1 Jun 62-30 Sep 64,
by M. Parker Givens. 10 Jan 65, 21p
Contract AF19 628 465, Proj. 5635, Task 563504
AFCRL 65-150

Unclassified report

Descriptors: (*Light transmission, Velocity), (*Optics, Light transmission), Mercury lamps, Light, Oscillation, Signal-to-noise ratio, Lasers, Gases, Modulation, Electron optics, Photomultipliers.

The work has been directed toward an experiment to measure the velocity of light using a well regulated

thermal light source such as a Mercury 198 isotope lamp and depending upon the random fluctuations of the source to substitute for the usual modulation (e.g. toothed wheel). In such an experiment the signal to noise problem is very severe and the major effort has been to consider possible ways of overcoming this difficulty. It was demonstrated that the beating between modes of a continuously operating gas laser serves to modulate the intensity and thus enables one to measure the velocity of light without any other modulating device. A new technique was devised and tested for measuring the variation in time of flight of electrons through a photomultiplier as a function of the cathode position from which they are emitted. (Author)

AD-615 006 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
RESEARCH ON THE DEFORMATION OF METAL CRYSTALS.
Final technical rept. for Oct 63-Nov 64,
by G. T. Horne and P. J. Wray. Jan 65, 40p
Contract AF33 615 1068, Proj. 7021, Task 702105
ARL 65-19

Unclassified report

Descriptors: (*Deformation, Metals), (*Metallic crystals, Deformation), Iron, Zone melting, Stresses, Relaxation time, Mathematical analysis, Cryogenics, Crystal lattice defects, Impurities, Metals, Alloys, Crystal lattices, Niobium, Copper, Single crystals, Tensile properties, Abstracting.

The results of two research topics are presented in detail as Parts I and II. Summaries of other research topics investigated conclude the report. PART I The Stress Relaxation of Zone Refined Iron at 77K. PART II A Study of a Strengthening Mechanism in Body Centered Cubic Metals. Research topics summarized only are: The Plastic Deformation of Niobium and Niobium Based Alloys at Low Temperatures; The Bauschinger Effect in Copper Single Crystals; The Deformation of Pure Face Centered Cubic Crystals.

AD-615 016 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Perkin-Elmer Corp., Norwalk, Conn. Electro-Optical Div.
GROWTH AND PROPERTIES OF THIN SINGLE CRYSTAL FILMS OF YTTRIUM IRON GARNET.
Final rept. for 1 Mar 63-31 Dec 64,
by Robert C. Linares. 31 Jan 65, 31p
Rept. no. M-7984
Contracts AF19 628 2796, AF19 628 4058, Proj. 4600, Task 460003
AFCRL 65-128

Unclassified report

Descriptors: (*Garnet, Ferromagnetic materials), (*Films, Single crystals), (*Single crystals, Ferromagnetic materials), Crystal growth, Light transmission, Surface properties, Thickness, Yttrium compounds, Iron compounds, Crystal lattices, Vapor plating, X-ray diffraction analysis.

Techniques were developed to grow single crystal films of a magnetic garnet (yttrium iron garnet) on a non-magnetic garnet substrate. A number of substrates were investigated, including Y3Al5012, Gd3Ga5012, and Y3(GaxIn1-x)5012. It was found that Gd3Ga5012 (which matches YIG in lattice constant) could be grown as large, relatively perfect crystals by the Czochralski technique. YIG films were grown by flux and vapor deposition. The perfection, optical transmission, surface characteristics, and thickness of these films were investigated. (Author)

AD-615 023 Div. 25, 2, 8
CFSTI Prices: HC$4.00 MF$1.00

Army Electronics Command, Fort Monmouth, N. J.
ATMOSPHERIC ATTENUATION OF LIGHT RADIATION FROM A POINT SOURCE IN AN ARCTIC ENVIRONMENT,
by Israel Cantor and Andrew Petriw. Oct 64, 135p
Technical rept. no. ECOM-2453
Proj. IV014501B53A, Task IV014501B53A13

Unclassified report

Descriptors: (*Light transmission, Attenuation), (*Atmosphere, Light transmission), Arctic regions, Greenland, Light, Atmospheric refraction, Meteorology, Optics, Night sky.

Twenty-two nighttime measurements were made of the atmospheric effects on light attenuation from a point source during the spring and fall of 1962 at a site on the Greenland icecap (Camp Century). Graphs are included to show the total and indirect intensity fluctuations over 12-second intervals under various atmospheric conditions. Some comparison is also made of the ratio of indirect/direct intensity vs optical depth under some Arctic and New Jersey shore atmospheric conditions. A much greater indirect/direct ratio in an Arctic environment of almost unity albedo, as compared to a local New Jersey environment of about 0.2 and 0.5 for the total albedo, is evident from some of the results noted. Three 'duct effects' were experienced when a maximum 3.5-fold and twofold increase of total intensity resulted; i.e., cases of 29 Oct and 13 Nov, respectively, compared to an atmosphere with a zero albedo and unlimited visibility, while the 15 Nov situation indicated a maximum 16-fold increase. However, each of the above-mentioned cases was complicated by the presence of some scattered fog patches. Results also indicate that intensities of light pulses from a point light source can vary by more than 100 percent at distances of 4.5 miles over 20-second time intervals. (Author)

AD-615 026 Div. 25, 8
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
QUANTUM STATISTICAL DYNAMICS OF LASER AMPLIFIERS,
by Dennis Holliday and A. E. Glassgold. Apr 65, 72p
Memo. no. RM-4516-PR
Contract AF49 638 700 Unclassified report

Descriptors: (*Lasers, Quantum statistics), (*Quantum statistics, Lasers), (*Amplifiers, Lasers), Light transmission, Mathematical models, Statistical functions, Pumping (Electronics), Attenuation, Hamiltonian.

A quantum statistical procedure for studying interacting radiation fields is developed and applied to a model laser operating as a linear amplifier. The method utilizes an expansion of the density matrix in terms of a complete set of orthogonal operators originally used by Weyl (Weyl, H., 'The Theory of Groups and Quantum Mechanics', Dover Publications, Inc. p. 272-276). One mode of the laser field is considered to interact with a pumping mechanism and with a loss mechanism. A general solution for the density matrix is obtained and then applied to various initial conditions. It is found that a classical statistical interpretation of the results is frequently appropriate. (Author)

AD-615 040 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDY OF ADSORPTION OF GASES ON SOLIDS IN

THE HIGH VACUUM RANGE.
Final rept. for 1 Jan 62-31 Dec 64,
by C. M. Bliven, J. V. Florio, and D. H. Baird.
28 Feb 65, 60p Rept. no. TR-65-255.9
Contract AF19 628 331, Proj. 5634, Task 563405
AFCRL 65-137

Unclassified report

Descriptors: (*Adsorption, Gases), (*Work functions, Solids), Low-pressure research, Surface properties, Oxygen, Nitrogen, Carbon compounds, Monoxides, Tungsten, Molybdenum, Silicon.

Investigation of the interaction of N2 with a hot W filament showed that a chemical pumping effect occurs and that the magnitude of this effect varied with temperature. The sticking probability of N2 on W was measured as a function of surface coverage. The data at lower coverages represents the temperature variation in the sticking probability. The surface concentration of N2 at saturation varied with the equilibrium pressure. In studies of the adsorption of O2 on Mo, the sticking probability and Mo work function changes were calculated as a function of O2 surface coverage. For the adsorption of CO on Mo, the calculated value of initial sticking probability and total number of adsorbed molecules are considerably smaller than expected, due to reversible sorption processes. Following the adsorption of CO on polycrystalline W, the subsequent introduction of O2 results in an increase in work function (from 5.2 eV to 6.4 eV) which indicates that a surface previously saturated with CO will not prevent the subsequent adsorption of O2. The retarding field technique for measuring work functions was applied to a silicon semiconductor surface. (Author)

AD-615 065 Div. 25

Uppsala Univ. (Sweden).
STUDY OF THE BORDONI PEAK IN SINGLE-CRYSTAL AND POLYCRYSTALLINE COPPER,
by M. Mongy, K. Salama, and O. Beckman.
3 Jul 64, 9p
Grant AF EOAR63 53
AFOSR 65-0746

Unclassified report

Pub. in Il Nuovo Cimento Serie X v34 p869-77 Nov 16 1964 (Copies available only to DDC users).

Descriptors: (*Copper, Crystallography), (*Spectroscopy, Copper), (*Ultrasonic radiation, Copper), (*Crystal lattice defects, Copper), Adsorption, Excitation, Heat of activation, Relaxation time, Frequency, Single crystals, Crystals, Sweden.

The Bordoni peak has been investigated in single-crystal and polycrystalline copper by measuring the longitudinal ultrasonic absorption at 10, 20 and 50 MHz, in the temperature range 80 to 300K. In the single-crystal sample, the measurements have been made in the three principal directions (111), (100) and (110). The values of the activation energy W and the relaxation frequency f sub 0, calculated from the frequency-dependence of the peak on the temperature scale, show a high degree of anisotropy. The comparison of the shape of the peak with Zener's single relaxation theory shows that the peak in the (111) direction is due to a single relaxation process. In the polycrystalline sample and in the other two directions of the single-crystal specimen, the results favour a spectrum of different relaxation frequencies with a constant activation energy. The spectrum width factor gamma differs from one case to the other, but gamma W has approximately the same value which equals the energy obtained in the (111) direction. (Author)

AD-615 066 Div. 25

Uppsala Univ. (Sweden).
DOPING STUDIES OF Bi2(Te,Se)3 ALLOYS,
by O. Beckman, P. Bergvall, and K. Tripathi.
1964, 9p
Grant AF EOAR63 53
AFOSR 65-0747

Unclassified report

Pub. in Arkiv for Fysik v28 n17 p215-21 Dec 28 1964 (Copies available only to DDC users).

Descriptors: (*Intermetallic compounds, Bismuth alloys), (*Bismuth alloys, Impurities), (*Impurities, Bismuth alloys), Sweden, Tellurium alloys, Sellenium alloys, Crystal lattices, Chemical bonds, Copper, Copper compounds, Bromides, Bismuth compounds, Iodides, Thermoelectricity, Magnetic properties.

Alloys of Bi2Te(3-x)Sex (0< or = X< or = 1) doped with controlled amounts of Cu, CuBr and BiI3 have been prepared according to the Bridgeman technique. The number, epsilon, of charge carriers per doping molecule as obtained from thermoelectric and galvanomagnetic measurements is found to vary with the selenium substitution. The results are explained in terms of the chemical bonding in the Bi2Te3 lattice. (Author)

AD-615 067 Div. 25, 15

Oslo Univ. (Norway).
ON FORMULATION OF SPINORS. II. THE QUESTION OF GENERALIZED SPIN (Ueber die Darstellung von Spinoren. II. Zur Frage des Generalisierten Spins),
by Egil A. Hylleraas. 6 Jul 64, 8p
Institute rept. no. IR-24
Contract AF61 052 134
AFOSR 65-0717

Unclassified report

Text in German
Pub. in Zeitschrift fuer Physik v182 p58-63 1964 (Copies available only to DDC users).

Descriptors: (*Quantum mechanics, Matrix algebra), Spin, Field theory, Transformations (Mathematics), Compton scattering, Bremsstrahlung, Relativity theory.

The method of spinor matrixes leads to a simple definition of a generalized spin, i.e. a spin-like operator that may be quantized for any selected free Dirac particle in any desired direction. This spin is compared with other possibilities.

AD-615 068 Div. 25, 4

Madrid Univ. (Spain).
THERMAL EXPANSION AND STACKING DISORDER IN MOLECULAR CRYSTALS. I. 2,2'-PYRIDIL (Dilatacion Termica y Desorden de Apilamiento en Cristales Moleculares. I. 2,2'-piridil,
by A. Felix, M. L. Canut, and J. L. Amoros. 1964, 11p
Grant AF EOAR62 92
AFOSR 65-0742

Unclassified report

Pub. in Bol. R. Soc. Espanola Hist. Nat. (Geol.) v62 p187-97 1964 (Copies available only to DDC users).
Text in Spanish; Summary in English.

Descriptors: (*N-heterocyclic compounds, Crystallography), (*Crystal lattice defects, N-heterocyclic compounds), (*Thermal expansion, N-heterocyclic

compounds), Aldehydes, Chemical bonds, Molecular association, X-ray diffraction analysis, Spain.

The thermal expansion quadric of 2,2'-pyridil (D1-2-pyridyl glyoxal) was determined by Weisenberg method, between-175 and 20C. The monoclinic crystal shows the maximum and minimum expansion in the plane (010). Although the bond system does not involve other bonds but van der Waals forces, the thermal expansion coefficients are smaller than the expected. 2,2'-pyridil is formed by curled sheets of molecules formed by chains of molecules along (101). This causes some possibility of stacking lines along rows of l = 1 (from 011 to 021) and l = 3 (from 013 to 043) which were detected in Weissenberg and Laue photographs of some single crystals. A two dimensional statistical model where stacking disorder along (001) of the layers of molecules has been introduced gives a Fraunhofer pattern showing general agreement with the x-ray experiments. Both ordered and disordered crystals can be obtain from a solution of the substance in ethanol. (Author)

AD-615 077 Div. 25, 15

Lockheed Missiles and Space Co., Palo Alto, Calif.
INFLUENCE OF FIELD INHOMOGENEITY ON IONIC LINE BROADENING,
by Karl Gerhard Muller. 21 Sep 64, 21p
Contract AF29 601 5006

Unclassified report

Pub. in Journal of Quantitative Spectroscopy and Radiative Transfer (England) v5 p403-23 1965 (Copies available only to DDC users).

Descriptors: (*Atomic spectroscopy, Perturbation theory), (*Field theory, Atomic spectroscopy), (*Line spectrum, Ions), (*Perturbation theory, Atomic spectroscopy), Electric fields, Plasma fields, Atomic energy levels, Electron transitions, Potential theory, Power series, Probability, Numerical methods and procedures.

The usual calculation of the ionic line broadening assumes a constant electric field, acting on an emitting atom. For a many-electron atom the quadratic Stark effect produces a shift proportional to 1/R to the fourth power where R is the distance perturber-atom. The actual Coulomb field of the ions possesses a field gradient, which for levels with a quadrupole moment causes a perturbation with 1/R-cubed. For N independently distributed ions, the probability distribution of the field gradient is calculated. Three approximate cases are discussed: the nearest neighbor approximation, the approximation of spatially fixed eigen-functions, and the nearest neighbour approximation of spatially fixed eigen-functions. The line profile due to the quasistatic gradient of the field is calculated for these three assumptions. A critical density can be derived by comparing the effect of the field inhomogeneity with the quadratic Stark effect. Below this critical density the effect of the field inhomogeneity dominates. For the example of neutral helium lines the critical density is evaluated and goes up to 10 to the 16th power - 10 to the 17th power particles per cu cm. (Author)

AD-615 082 Div. 25, 20
CFSTI Prices: HC$2.00 MF$0.50

Illinois Univ., Urbana. Dept. of Physics.
SURFACE STUDIES USING THE MOSSBAUER EFFECT,
by J. W. Burton, H. Frauenfelder, and R. P. Godwin.
1965, 28p
Contract AF49 638 1048

Unclassified report

Descriptors: (*Mossbauer effect, Crystal structure), (*Crystal structure, Surface properties), (*Surface properties, Mossbauer effect), Low-pressure research, Gamma emission, Magnetic fields, Electric fields, Doppler effect, Anisotropy, Iron, Tungsten.

The mossbauer effect, because of its sensitivity to strength and angular distribution of binding, to magnetic and electric fields, and to thedensity of s electrons at the nucleus, is used to study crystal surfaces. The theory involved is sketched, the experimental approach is reviewed, and experimental results are discussed.

AD-615 083 Div. 25, 15
CFSTI Prices: HC$2.00 MF$0.50

Illinois Univ., Urbana. Dept. of Physics.
DYNAMICAL PROPERTIES OF A ONE-DIMENSIONAL 'CRYSTAL' WITH FREE ENDS,
by John R. Clem and Robert P. Godwin. 1965, 36p
Contract AF49 638 1048

Unclassified report

Descriptors: (*Crystals, Dynamics), (*Statistical mechanics, Crystal structure), (*Surface properties, Crystals), Vibration, Harmonic analysis, Quantum mechanics, Specific heat, Mossbauer effect, Crystal lattices, Low-pressure research, Hamiltonian, Matrix algebra.

The one-dimensional free end crystal model is examined. Calculations are made of dynamical quantities (atomic mean square displacements and velocities), and it is shown that these results are analytic.

AD-615 089 Div. 25

Lockheed Missiles and Space Co., Sunnyvale, Calif.
PIEZORESISTIVITY IN SEMICONDUCTORS,
comp. by Sally Landels. 1957, 5p
Special bibliography no. SB-59-32

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Bibliographies, Semiconductors), (*Semiconductors, Piezoelectric effect), (*Piezoelectric effect, Semiconductors), Electrical properties, Magnetic properties, Germanium, Indium alloys, Antimony alloys, Electromagnetic effect, Hall effect, Magnetic fields, Generators, Piezoelectric crystals.

AD-615 104 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Allison Div., General Motors Corp., Indianapolis, Ind.
THERMAL IONIZATION AND RESISTIVITY OF COPPER GAS PLASMA.
Engineering Department rept.
by George M. Palmer. May 61, 17p
Rept. no. EDR-2187
Contract AF49 638 864, Proj. 9752, Task 37521
AFOSR 1280

Unclassified report

Descriptors: (*Copper, Plasma medium), (*Resistance (Electrical), Copper), (*Gas ionization, Copper), Thermal properties, High-temperature research, Graphics, Theory.

The study was instigated to determine a functional variation of the resistivity of copper gas plasma as a function of temperature and pressure. Graphics are

presented for ionization level versus temperature at constant pressures, resistivity of copper gas versus temperature at constant pressures, collision cross section values versus temperature for copper gas at constant pressures, and electron particle density versus temperature for copper gas at constant pressures. Pressures are 0.1, 1, 10, 100, 1,000 and 10,000 atmospheres.

AD-615 112 Div. 25, 8
CFSTI Prices: HC$2.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
FURTHER CONSIDERATIONS ON REGENERATIVE RUBY LASER AMPLIFIERS,
by Harold Jacobs, Frank A. Brand, C. LoCascio, G. Novick, and J. Castro. Mar 65, 40p
Technical rept. no. ECOM-2575
Proj. 1P6 22001A056, Task 1P6 22001A056 03
Unclassified report

Descriptors: (*Lasers, Ruby), (*Amplifiers, Lasers), Light transmission, Air, Crystals, Reflection, Gain, Attenuation, Low-temperature research, Oscillators, Oscillation.

Experiments were initiated to investigate the validity of amplifiers using ruby at liquid nitrogen temperatures. A transmission system was set up and by controlling the relative time delays in firing both rods, the properties of transmitted power gain were studied. It was found that both the oscillator and amplifier rubies when uncoated, could be made to oscillate for about 100 micro sec giving a well-defined pulse of quasi CW operation. The gain of the amplifier increased as the times of the input signal from the oscillator approached the time at which the amplifier went into oscillation. If the oscillator was delayed so that its signal occurred at increasing time after the amplifier oscillations had ceased, the power gain decreased, even though the amplifier crystal was still being pumped. Finally, with still further delay in signal relative to the amplifier oscillation period, an attenuation in transmission was observed. Analysis of these data provides information which is consistent so far with the previously reported theory. (Author)

AD-615 126 Div. 25, 4
CFSTI Prices: HC$1.00 MF$0.50

Franklin Inst., Philadelphia, Pa.
A STUDY OF SURFACE PHENOMENA ON ORGANIC SOLIDS.
Quarterly progress rept. no. 3, 10 Dec 64-9 Mar 65,
by P. J. Reucroft, P. Chairge, and M. M. Labes.
19 Mar 65, 14p
Contract DA18 035AMC141A
Unclassified report

See also AD-609 965.

Descriptors: (*Organic materials, Surface properties), (*Ammonia, Adsorption), (*Krypton, Adsorption), (*Semiconductors, Polymers), Chemisorption, Solid state physics, Quinones, Chlorine compounds, Sulfur compounds, Nitrides, Complex compounds.

The adsorption of krypton and ammonia on theorganic solid p-chloranil has been investigated. Isotherms were obtained for krypton at 77.36 K and ammonia at 194 K. The adsorption of krypton is reversible and reproducible. The affinity for ammonia is much higher, irreversible behavior and reduced adsorptive capacity on repeated adsorption being obtained for this system. These results indicate that the adsorption of krypton is pure physical adsorption whereas ammonia is both physically adsorbed and chemisorbed. (Author) An appendix gives details of investigations into polymeric semiconductors: polysulfur nitride, conjugated polymers, and polymer charge transfer complexes.

AD-615 136 Div. 25

Dunham Lab., Yale Univ., New Haven, Conn.
INVERSION MECHANISMS IN GAS LASERS,
by W. R. Bennett, Jr. 1965, 31p
Contract DA31 124AROD124
AROD 4313:7
Unclassified report

Pub. in Applied Optics Supplement 2 of Chemical Lasers p3-33 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Gases), Atomic energy levels, Electron transitions, Excitation, Pumping (Electronics), Transients, Oscillators, Electrons, Density, Helium, Neon, Nitrogen.

A review of recent developments in the gas laser field is given which is intended to supplement a previous, more detailed paper by the author on the same subject. In addition, a number of new results have been described. The present paper has six main sections dealing with: a summary of general laser considerations, inversion saturation mechanisms in four-level systems, possible two- and three-level collision lasers, stimulated emission pumping, transient inversions, and ion lasers. Emphasis has been placed on atomic systems in this work and a summary of currently known gas laser transitions is included as an appendix to this paper. (Author)

AD-615 147 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
INJECTION LASER STUDY.
Quarterly progress rept. no. 7, 1 Dec 64-28 Feb 65,
by K. Konnerth, F. F. Morehead, F. Stern, P. R. Wagner, and K. Weiser. 28 Feb 65, 98p
Contract DA36 039AMC02349E, Proj. 1P622001A056
Unclassified report

See also AD-603 651.

Descriptors: (*Lasers, Diodes (Semiconductor)), (*Diodes (Semiconductor), Lasers), (*Semiconductor devices, Lasers), Gallium alloys, Arsenic alloys, Injection, Luminescence, Dielectric properties, Wave transmission, Quantum mechanics, Numerical method and procedures, Monochromatic light, Absorption, Amplifiers, Models (Simulations), Intermetallic compounds.

A summary of the switching characteristics of P-P(o)-N negative resistance diodes is presented, and theory is compared with experiment. Yellow electroluminescence was found at 77K by injecting electrons from an indium contact into an insulating region on the surface of phosphorus-doped ZnTe. The emission was observed in a 30-micron-thick layer adjacent to the contact, and had a quantum efficiency of 0.0001. No visible emission was obtained at room temperature. Times delays between the start of a current pulse and the onset of lasting in typical zinc-diffused GaAs lasers are of the order of nanoseconds at 77K, and are accounted for by the time required to build up the population inversion in the active layer. At higher temperatures the delays are longer, and may be explained by trapping. Typical room temperature results are shown. A simple model of the absorption or amplification of high-intensity monochromatic light in a semiconductor absorber or amplifier is presented.

AD-615 148 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Ohio State Univ. Research Foundation, Columbus.
STUDY OF EMISSION SPECTRA BY PHASE-DISCRIMINATION METHODS.
Scientific rept. no. 4 (Final) for Jul 60-31 Jan 65,
by Fred P. Dickey and William H. Rogge. Feb 65, 77p
Contract AF19 604 6150, Projs. 7670, 1078,
Task 767002
AFCRL 65-246

Unclassified report

Research to continue under Contract AF19 628 4331.
Continuation of Contract AF19 604 2254.
See also AD-609 300.

Descriptors: (*Hydroxides, Molecular spectroscopy), (*Molecular spectroscopy, Phase detectors), Infrared spectroscopy, Vibration, Rotation, Spectrum analyzers, Test methods, Line spectrum, Tables, Lead compounds, Sulfides.

A progress report is given on the emission spectrum of the OH radical in the regions of the fundamental and first overtone vibration-rotation bands. The observations were made using a high resolution prism-grating vacuum spectrometer. The strong background which results from water vapor emission was eliminated by using two flames together with a phase-discrimination method of detection. A cooled lead sulphide detector was used to observe the fundamental band in the region from 2600/cm to 4000/cm. Lines from the 1-0, 2-1 and 3-2 bands were observed. An uncooled lead sulphide detector was used to observe the first overtone band in the region from 5700/cm to 7200/cm. Lines from the 2-0, 3-1 and 4-2 bands were observed. (Author)

AD-615 152 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
SOLID STATE RESEARCH USING HIGH MAGNETIC FIELDS.
Final rept. for 1 Jul 60-31 Oct 64,
by Benjamin Lax and Francis Bitter. 15 Feb 65, 46p
Contract AF19 604 7344
AFOSR 65-0733

Unclassified report

Descriptors: (*Solid state physics, Magnetic fields), (*Magnetic fields, Solid state physics), Magneto-optic effect, Magnetic properties, Magnetic resonance, Theory, Gadolinium, Crystals, Rare earth elements, Electron transitions, Plasma oscillations, Cryogenics, Transport properties, Semiconductors, Magnets, Superconductors, Physics laboratories.

A summary of work done at the National Magnet Laboratory, founded at the Massachusetts Institute of Technology by the Air Force Office of Scientific Research, is presented. The laboratory provides continuous magnetic fields of 255 kilogauss, 100 kilogauss stronger than available elsewhere. The number and variety of high field magnets and the ease and flexibility of their use are unequalled in the world. The fields of activity have included solid state, low temperature and plasma physics. Within these areas such phenomena as superconductivity, magneto-optical effects, cyclotron and magnetic resonance, and transport effects in metals, semimetals and semiconductors were investigated.

AD-615 163 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Westinghouse Research Labs., Pittsburgh, Pa.
MEASUREMENT OF CESIUM EXCITATION CROSS SECTION NEAR THRESHOLD BY A SWARM TECHNIQUE,
by J. F. Nolan and A. V. Phelps. 15 Apr 65, 38p
Technical rept. no. TR-28
Contract Nonr258400, Proj. 4720; ARPA Order 125 63

Unclassified report

Rept. on Proj. Defender.

Descriptors: (*Molecular beams, Cesium), (*Cesium, Excitation), Gas ionization, Probability, Partial differential equations, Atomic energy levels, Statistical distributions, Electron transitions, Momentum.

Electron drift velocities were measured in cesium-argon mixtures for E/N values between 3 x 10 to the -19th power and 5 x 10 to the -18th power V-sq cm and cesium to argon concentration ratios between to the -8th power and 10 to the -5th power. The drift velocity was obtained from measurements of the electron transit time using an ac technique which is a modification of a technique developed originally by Rutherford for ion drift velocity measurements. Numerical solutions of the Boltzmann transport equation were used to determine an excitation cross section which is consistent with the experimental drift velocity data. For a single excitation threshold at 1.386 eV, the best slope for a linear cross section is 7.1 x 10 to the -15th power sq cm/eV. If excitation to the 6 P-1/2 and 6 P3/2 states is considered separately, with thresholds at 1.386 eV and 1.454 eV respectively, the linear cross sections obtained have a slope of 2.5 x 10 to the -15th power sq cm /eV for 6 P-1/2 excitation, and 5.0 x 10 to the -15th power sq cm/eV for 6 P-3/2 excitation. The range of validity of these values is from threshold up to about 1.8 eV. Other shapes for the cross section are investigated. The experimental cross section is in reasonable agreement with extrapolations of theoretical cross sections. (Author)

AD-615 177 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Aerospace Technology Div., Library of Congress, Washington, D. C.
SOVIET LASER BIBLIOGRAPHY: ANALYTICAL SURVEY.
6 May 65, 59p ATD-P-65-23
TT 65-62200

Unclassified report

Rept. on Surveys of Soviet of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Lasers, Bibliographies), Paramagnetic materials, Gases, Semiconductor devices, Spectroscopy, Gamma rays, Optics, Quantum mechanics, USSR, Reviews.

The bibliography on Soviet laser research covers the period from January 1961 to September 1964. The following topics are discussed: Gaseous lasers, lasers based on paramagnetic materials, lasers based on semiconductor materials, exotic lasers, spectroscopy of paramagnetic laser materials, laser theory, and laser applications and effects.

AD-615 178 Div. 25, 7

National Research Council of Canada, Ottawa (Ontario).
CORONA PHENOMENA FROM WATER DROPS ON

SMOOTH CONDUCTORS UNDER HIGH DIRECT VOLTAGE,
by M. Akazaki. 4 Nov 63, 8p NRC-8282

Unclassified report

Pub. in IEEE Transactions on power Apparatus and Systems v pas84 n1 p1-8 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electrical corona, Transmission lines), Water, Drops, Voltage, Direct current.

The effect of high direct voltage on the formation and dislodging of water drops hanging from a smooth conductor will be shown and used to explain the resulting corona characteristics, such as pulse amplitude and repetition rate, audible noise, radio influence (RI) and loss current, and corona current waveforms. Phenomena taking place during the conductor-drying period are also explained. The relationship between the number and spacing of points on a smooth conductor, on one hand, and RI and loss current, on the other, is demonstrated. Results obtained from water-drop experiments are compared with those from experiments using metal points of various shapes. (Author)

AD-615 183 Div. 25

Kansas State Univ., Manhattan.
CONVECTIVE MODEL OF HARTMANN FLOW,
by L. T. Fan, C. L. Hwang, and W. S. Hwang.
8 Jun 64, 3p
Grant AF AFOSR463 64
AFOSR 65-0564

Unclassified report

Pub. in AIAA Journal v2 n10 p1859-60 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetohydrodynamics, Mathematical models), Fluid flow, Statistical functions, Magnetic fields, Velocity.

AD-615 186 Div. 25

Northwestern Univ., Evanston, Ill. Technological Inst.
SHELL BUCKLING AND NONCONSERVATIVE FORCES,
by George Herrmann and Richard W. Bungay.
31 Jan 64, 1p
Grant AF AFOSR100 64
AFOSR 65-0560

Unclassified report

Pub. in AIAA Journal v2 n6 p1165-6 Jun 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Structural shells, Buckling (Mechamics)), (*Force (Mechanics), Buckling (Mechanics)), (*Buckling (Mechanics), Structural shells), Loading (Mechanics).

The paper refutes the suggestion that wide scatter of observed buckling loads of pressurized shells might be attributed to the presence of nonconservative generalized forces.

AD-615 189 Div. 25

Texas Univ., Austin.
ATOMIC EMISSION OF THE HELIUM AFTERGLOW,
by Franklin E. Niles and W. W. Robertson.
14 Feb 64, 5p
Grant AF AFOSR273 64, Proj. 9750, Task 975002
AFOSR 65-0562

Unclassified report

Pub. in Journal of Chemical Physics v40 n12 p3568-71 Jun 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Helium, Spectroscopy), (*Atomic spectroscopy, Helium), (*Molecular spectroscopy, Helium), Excitation, Gas discharges, Ions, Line spectrum, Band spectrum.

The spectral emission from a dc pulsed helium discharge for pressures from 5 to 20 Torr has been investigated during the early afterglow using interference filters with gated photomultiplier. The radiation transmitted by the filters consists generally of both atomic lines and molecular bands and after the termination of the active discharge shows characteristically an initial rapid decrease in intensity followed by a much slower rate. The rapid decrease is due to the atomic radiation, the slower to molecular. By subtracting the molecular emission from the total emission transmitted through an interference filter, the atomic emission is obtained. From the decay curves of the atomic emission, which is the result of collisional-radiative recombination of He+, and the known diffusion loss of He+, the rate of conversion of He+ into He2+ is found to be 109±6/sec. Torr squared. (Author)

AD-615 190 Div. 25, 4

Vanderbilt Univ., Nashville, Tenn. Dept. of Chemistry.
THE EMISSION SPECTRUM OF THE BOF2 MOLECULE.
by C. Weldon Mathews and K. K. Innes. 26 Jun 64, 12p
Contract DA31 124AROD317
AROD 4283:2

Unclassified report

Pub. in Journal of Molecular Spectroscopy v15 n2 p199-210 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Boron compounds, Oxyfluorides), (*Oxyfluorides, Molecular spectroscopy), (*Molecular spectroscopy, Boron compounds), Fluorides, Emissivity, Band spectrum, Molecular properties, Chemical bonds, Thermochemistry.

The 5800-A bands of the BF3 discharge were studied with the goal of positive identification of the emitter. The boron and oxygen vibrational isotope effects demonstrated that the emitting molecule contains only one each of these atoms. A study of the intensity of the bands as a function of the ratio of boron to fluorine indicated that the emitter is the BOF2 molecule or molecule-ion. By analogy with the known spectrum of the 31-electron molecule NO3, the assignment is made to the BOF2 molecule. Both vibrational and rotational structure, including very small isotope effects in the former, are consistent with a planar model of point group C2v in each electronic state. The rotational contours are those of parallel-type bands of a nearly symmetric top. If the three bond angles are all near 120 degrees, the top is nearly oblate and the electronic transition moment is perpendicular to the plane of the molecule. (Author)

26. Production and Management

AD-614 602 Div. 26, 17
CFSTI Prices: HC$2.00 MF$0.50

Allegheny Ludlum Steel Corp., Brackenridge, Pa.
TANTALUM ALLOY TUBING DEVELOPMENT PROGRAM.
Interim technical engineering rept. no. 5, 15 Jul 64-31 Mar 65,
by F. S. Turner. Apr 65, 35p
Contract AF33 657 11261, Proj. 8 109
RTD TR-8-109 (V)
Unclassified report

See also AD-606 516.

Descriptors: (*Tantalum alloys, Pipes), (*Extrusion, Tantalum alloys), (*Pipes, Tantalum alloys), Tungsten alloys, Hafnium alloys, Carbon alloys, Molybdenum, Cladding, Hardness, Recrystallization, Transition temperature, Temperature, Tensile properties, Heat treatment, Metallography.

Extrusion data obtained during the second and third extrusion campaigns are presented. The Ta-10W alloy was successfully extruded to 2.060-inch O.D. by 1.440-inch I.D. tube hollows from a 5-inch liner system on a 2,200 ton press. The billets were heated and extruded bare from a billet temperature of 3100F using a glass lubrication system. The T-222 alloy billets were also successfully extruded from a temperature of 3000F but it was necessary to can the T-222 billets in unalloyed molybdenum in order to lower the extrusion pressures. Results of the post-extrusion processing and evaluation in terms of hardness, room temperature, tensile properties, metallographic examination, response to heat treatment and chemical analysis are presented. (Author)

AD-614 628 Div. 26, 1
CFSTI Prices: HC$6.00 MF$1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WAYS OF FURTHER IMPROVEMENT OF ORGANIZATION AND PLANNING OF AVIATION PRODUCTION: COLLECTION OF ARTICLES,
ed. by I. B. Kuksin. 9 Feb 65, 222p
FTD-MT-64-246
TT 65-62276
Unclassified report

Edited machine trans. of mono. Puti Dalneishego Sovershenstvovaniya Organizatsii i Planirovaniya Aviatsionnogo Proizvodstva: Sbornik Statei, Moscow, 1963, 176p (Trudy Instituta, Vyp. 1).

Descriptors: (*Aircraft industry, Management engineering), (*Management engineering, Aircraft industry), Automation, Machine shop practice, Mechanical working, Aircraft equipment, Instrumentation, Radio equipment, Costs, Standards, Industrial production, USSR.

Contents: Certain questions of organization of production in automatic sections of mechanical-treatment; Experience of designing of group treatment of parts in mechanical workshops of aircraft building factories; Methods of distribution of output of finished products by ten-day periods and months of plan period; Establishment of nomenclature of instruments and radio parts of assemblies of general purpose applied in aviation for specialization of their production; Certain questions of development of technical standardization in machine building; Technological equipment of production of aircraft engines and method of determination of its optimum level; Methods of calculation of economic effectiveness of specialization of aircraft building production; Certain methods of determination of prime cost radio-electronic equipment; Method of enlarged calculation of technico-economic effectiveness of equipment of technological processes.

AD-614 701 Div. 26, 15, 30
CFSTI Prices: HC$2.25 MF$0.75

Naval Civil Engineering Lab., Port Hueneme, Calif.
A GRAPHICAL PERT ANALOG.
Rept. for Oct 62-Dec 64,
by David F. Sampsell. Apr 65, 64p
Technical rept. R-370
Proj. Y R011 01 01 075
Unclassified report

Descriptors: (*Operations research, Management planning), (*Management planning, Operations research), (*Graphics, Management planning), Scheduling, Costs, Time, Analog systems.

This publication is intended as a guide for planners and schedulers of projects not governed by current directives concerning the use of PERT or the Critical Path Method. The Graphical PERT Analog is an integrated non-computer method of planning and scheduling the component activities of a project in terms of both time and cost. Essentially, GPA is a graphical approach to the PERT concept of project analysis. As is generally true of PERT methods, GPA can assist management to utilize available productive resources effectively; however, compared to other non-computer methods presently used, GPA techniques are more straightforward and require minimal arithmetic calculations. GPA comprises three basic topics which can be selectively employed to suit the requirements of management control: (1) The analysis of a project's component activities and a synthesis of these activities into a time-phased flow diagram schedule. (2) The derivation of least-cost schedules for accelerated projects. (3) The determination of predicted cumulative direct costs as a function of time for a given project duration. Instructions are given for setting up a flow diagram schedule, and examples and exercises for practical applications of GPA methods are provided. (Author)

AD-614 771 Div. 26
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TECHNIQUE OF MAKING A CUTTING TOOL WITH BRAZED HARD ALLOY TIPS,
by V. N. Artsimovich, E. M. Partikeeva, I. A. Tokarev, I. I. Yanovskii. 7 Apr 65, 5p FTD-TT-65-297
TT 65-62091
Unclassified report

Unedited rough draft trans. of Russian patent 153286, appl. 761828/22-2, Jan 25 1962.

Descriptors: (*Cutting tools, Manufacturing methods), Alloys, Brazings, Stresses, Wear resistance, Cold working, Hardening, Low-temperature research, USSR.

The object of the invention is a technique for making cutting tools with brazed, hard alloy tips. The tool is subjected to cold hardening at a temperature of -100 to -183C after the hard alloy tip has been brazed on to reduce internal stresses in the braze zone and to increase durability.

AD-614 772 Div. 26
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF PULSE WELDING AND FACING WITH A VIBRATION ELECTRODE,
by G. A. Mirlin. 7 Apr 65, 5p FTD-TT-65-298
TT 65-62092

Unclassified report

Unedited rough draft trans. of Russian patent 153760, appl. 601395/25, Jun 9 1958.

Descriptors: (*Welding, Oscillation), Electrodes, Vibration, Electric currents, Vibrators (Electrical), Welding fluxes, Controlled atmospheres, USSR, Patents, Welding rods, Synchros, Vibrators (Mechanical).

This method of pulse welding and surfacing with a vibration electrode under flux or in a medium of protective gases, during which electrode vibration is accomplished synchronously with weld-current pulses, is distinguished by the fact that in order to broaden the range of possible regimes and to enhance weld quality, weld pulses are generated by modulation or interuption of the current with regulation of amplitude, duration and frequency. (Author)

AD-614 804 Div. 26
CFSTI Prices: HC$2.00 MF$0.50

Mechanical Technology, Inc., Latham, N. Y.
ANALYSIS OF A HYDROSTATIC JOURNAL BEARING LUBRICATED BY CONDENSING STEAM.
Technical rept.,
by T. Chiang. 24 Mar 65, 45p MTI 65TR11, MTI-23(1-23)
Contract Nonr373100, Proj. NR062 290

Unclassified report

Descriptors: (*Journal bearings, Lubricants), (*Lubricants, Steam), Gas bearings, Hydrostatic pressure, Condensation, Films, Loading (Mechanics), Numerical analysis, Perturbation theory.

The report presents an analytical investigation of the externally-pressurized, steam-lubricated journal bearing. In the case under consideration, the supply steam is saturated (or slightly superheated) and the bearing temperature is lower about 20F than that of the supply steam. Two models are used in the analysis: (1) Steam condenses completely into water at the bearing (film) inlet and re-evaporates somewhere before the exit. (2) After entering the film, steam becomes a two-phase mixture, but it remains to be a homogeneous fluid. The wet steam becomes dry again before the exit. It is shown that the steam bearing does not deviate much from a gas bearing. An analysis is performed and solutions are obtained by perturbation calculation based on the eccentricity ratio. Numerical calculations were programmed on the IBM 1620 computer. The static load-carrying capacity in the normal operating range of a dry steam (gas) bearing is shown to be considerably reduced due to condensation. (Author)

AD-614 806 Div. 26, 17
CFSTI Prices: HC$3.00 MF$0.75

ManLabs, Inc., Cambridge, Mass.
THERMOMECHANICAL TREATMENTS APPLIED TO ULTRA-HIGH STRENGTH STEELS.
Final technical rept.,
by David Kalish and S. Andrew Kulin. Apr 65, 84p
Contract NOw64 0356c, Proj. WR007 05 01

Unclassified report

See also AD-611 025.

Descriptors: (*Steel, Hot working), (*Hot working, Steel), Nickel alloys, Cobalt alloys, Toughness, Carbon alloys, Austenite, Deformation, Heat treatment, Bainite, Martensite, Strain (Mechanics), Mechanical properties, Microstructure, Fracture (Mechanics).

The response of 9% nickel and 4% cobalt steels to thermomechanical treatments was evaluated with particular emphasis on fracture toughness. Two carbon contents, 0.25 and 0.45%, were studied. The thermomechanical treatments involved austenite deformation processes and strain-tempering processes with either martensite or bainite being the transformation product. The properties of undeformed structures were also measured for comparison purposes. Thermal and strain-tempering treatments applied to 9-4-45 develop two bands of precracked Charpy impact energy versus yield strength, one for martensites and one for bainites. In the yield strength range 200,000 to 340,000 psi the bainites possess substantially higher impact strengths than the martensites at equivalent strength levels. Austenite deformation processes do not improve the impact strength of 9-4-45 for treatments involving 50% deformation. Strain-tempering of the 9-4-25 steel develops yield strengths from 200,000 to 300,000 psi. At these strength levels this steel has higher impact energies than the 0.45% carbon steel. The level of both K sub IC and yield strength in the 9-4-xx steels may be increased by thermomechanical treatments, such that combinations of K sub IC and yield strength are obtained that are equivalent or superior to those developed in the 18 nickel maraging alloy. (Author)

AD-614 847 Div. 26, 8, 15
CFSTI Prices: HC$1.00 MF$0.50

Polytechnic Inst. of Brooklyn, N. Y. Dept. of Electrical Engineering.
MATHEMATICAL MODELS FOR DRIFT FAILURE ANALYSIS,
by Martin L. Shooman. 1965, 12p
Contract AF49 638 1402; Grant AF AFOSR62 280
AFOSR 65-0623

Unclassified report

Proceedings of the National Symposium on Reliability and Quality Control (11th) Miami Beach, Fla. January 12, 13, 14, 1965.

Descriptors: (*Reliability (Electronics), Mathematical models), (*Probability, Reliability (Electronics)), Quality control, Distribution theory, Transformations (Mathematics), Stochastic processes, Taylor's series, Networks, Drift.

Several mathematical techniques which are available for the analysis of drift failures are discussed. The conventional techniques of drift failure analysis are 'stacking-up-the-tolerance', worst case analysis, and expansion of the performance function in a Taylor series which is truncated after the linear terms. These techniques are simple to apply but are rather inaccurate in many cases. The very general approach involving the change of random variables theorem is discussed; however, the resulting integral expressions are only amenable to solution and interpretation in special cases. The specific moment relationships are computed for Gaussian and Rectangular distribution models. A discussion of how one can estimate parameter moments from manufacturer's specifications is included. The probabilistic expressions including the quadratic terms are derived. The partial derivative coefficients in the Taylor series are related to sensitivity functions used in system theory and network theory. A probabilistic interpretation is given to slacking up the tolerances and worst case analysis.

AD-614 904 Div. 26, 15, 32
CFSTI Prices: HC$4.00 MF$0.75

Stanford Univ., Calif. Dept. of Industrial Engineering.
A DYNAMIC MULTI-PRODUCT MULTI-FACILITY PRODUCTION AND INVENTORY MODEL,
by Willard I. Zangwill. 29 Apr 65, 104p
Technical rept. no. TR-3
Contract Nonr22577, Proj. NR347 010
Unclassified report

See also AD-612 716.

Descriptors: (*Production control, Mathematical models), (*Inventory analysis, Optimization), (*Dynamic programming, Economics), Industrial production, Management planning, Operations research.

This paper develops a multi-product, multi-facility economic lot size model. Roughly speaking, economic lot size models deal with production and inventory situations in which the product demand is known in advance and in which the cost functions are concave. The objective of the model is to determine a production schedule, in terms of how much to produce and when, that minimizes overall cost. Another important aspect of the model is that it allows backlogging of unsatisfied demand. The backlogging analysis actually requires consideration of inventory cost functions which are not concave. To treat such situations the piecewise concave function was developed. Basically a piecewise concave function is the maximum of a collection of concave functions. Using the notion of piecewise concavity a small set of production schedules is determined that contains the minimum cost schedule. Dynamic programming algorithms are presented to efficiently calculate the minimum cost schedule for the 'series' and 'parallel' cases. (Author)

AD-614 942 Div. 26
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FLUX FOR DIP SOLDERING,
by L. B. Ivanova, B. A. Maksimikhin, and M. A. Nesterova. 7 Apr 65, 5p FTD-TT-65-299
TT 65-62131
Unclassified report

Unedited rough draft trans. of Russian patent 153826, appl. 782482/25-8, Jun 11, 1962.

Descriptors: (*Soldering fluxes, Patents), Soldering, Alcohols, Amines, Chlorides, Effectiveness, Corrosion inhibition, USSR.

The purpose of invention is a flux, for the dip-solder method, containing glycerin and diethylamine hydrochloride. To increase flux activity and fluidity at 160 to 240 C and to increase the corrosion resistance of solder fusions, the flux components are taken in the following percentage ratio: glycerin 95 to 97, diethylamine hydrochloride 5 to 3. (Author)

AD-614 944 Div. 26, 17

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONFERENCE ON METALLOGRAPHY AND HEAT TREATMENT, ODESSA, MATERIALS. (SELECTED ARTICLES).
9 Apr 65, 25p FTD-TT-64-799
TT 65-62133
Unclassified report

Unedited rough draft trans. of mono. Konferentsiya po Metallovedeniyu i Termicheskoi Obrabotke, Odessa, 1960. Materialy, 1962 p211-5, 245-57.
Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Steel, Hardening), (*Ultrasonic radiation, Hardening), (*Hardening, Steel), Ammonia, Nitrogen, Diffusion, Hardness, High-temperature research, Nitrides, Microstructure, Surface properties, Metallography.

Contents:
Nitriding of steel under the effect of ultrasound, by G. V. Zemskov, L. K. Gushchin and Ye V. Dombrovskaya, et al.
Characteristic features of steel nitrided at high temperatures, by T. M. Pogrebetskaya, A. A. Yurgenson and A. V. Kostenko.

AD-614 950 Div. 26
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE EMPLOYMENT OF PLASMA HEATING IN WELDING PROCESSES,
by K. V. Vasil'ev and A. A. Isachenko. 13 Apr 65, 23p FTD-TT-64-1140
TT 65-62139
Unclassified report

Unedited rough draft trans. of Vsesoyuznyi Nauchno-Issledovatel'skii Institut Avtogennoi Obrabotki Metallov. Trudy (USSR) v8 p55-71 1962.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Welding, Plasma medium), (*Plasma medium, Welding), Heating, Welds, Microstructure, Electric arcs, Experimental data, Electric currents.

An experimental investigation was made of plasma heating in welding processes. The conclusions of the investigation are: Penetrating arcs of normal regime forming in tips with outer water cooling are energetically more appropriate than plasma streams corresponding to them in electrical power or in basic currents. The current of a penetrating arc should correspond to the diameter of the output duct of the forming tip. A current increase lowers heat distribution in the penetrating arc (above a certain limit), but is energetically indifferent for a plasma forming arc. An increase in gas consumption improves the conditions of utilizing arc energy. In the range of small consumptions the utilization of energy of plasma generating arc decreases considerably. The derived conclusions allow for a better and more rational evaluation of the propriety of using plasma heating in individual welding processes.

AD-614 966 Div. 26, 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTROMAGNETIC FLAW DETECTOR,
by I. P. Parshin and P. I. Beda. 19 Apr 65, 6p
FTD-TT-64-1284
TT 65-62155
Unclassified report

Unedited rough draft trans. of Russian patent 156735, appl. 779612/25-8, May 24, 1962.

Descriptors: (*Quality control, Measuring devices (Electrical and Electronics)), (*Measuring devices (Electrical and Electronics), Test equipment), (*Nondestructive testing, Measuring devices (Electrical and Electronics)), Electromagnetic properties, Correlation techniques, USSR.

In the proposed flaw detector the principle of comparison of two articles of the same type (the tested and the standard) is used for checking two symmetrically placed surfaces of one item with the aid of two differentially connected-up pickups. A defect on one of the two simultaneously checked surfaces creates an imbalance in the voltages in the differential scheme of connecting in the pickups causing the needle of the checking instrument to deviate. The direction of the deviation of the needle indicates which of the checked surfaces has a flaw.

AD-615 033 Div. 26, 8, 18
CFSTI Prices: HC$3.00 MF$0.75

Mitre Corp., Bedford, Mass.
INTERSYSTEM INTEGRATION ASPECTS OF THE AIR FORCE SYSTEM ACQUISITION PROCESS FOR ELECTRONIC SYSTEMS,
by Robert C. Grandy and John Nicholls. Apr 65, 87p Technical memo. no. TM-04158
Contract AF19 628 2390, Proj. 400 0
ESD TR-65-108

Unclassified report

Descriptors: (*Management planning, Systems engineering), (*Systems engineering, Air force procurement), (*Air force procurement, Electronic equipment), (*Electronic equipment, Air force procurement), Information retrieval, Command and control systems, Military requirements, Compatibility.

This report discusses the implicit intersystem integration aspects of the current DOD and Air Force systems management doctrine as it applies to the acquisition of large scale electronic systems. The normative flow of the acquisition process, abstracted from Air Force and Air Force Systems Command regulations and manuals in the 375 series, is described. Important intersystem integration activities and events are then identified and associated with this basic process as a means of establishing a foundation for the proper consideration of intersystem relationships during the planning, design and development of large electronic systems. Proposed formats for the preparation of specific documentation that can be used to record the intersystem requirements for inclusion in the primary system documentation are provided in the Exhibits at the end of the report. (Author)

AD-615 086 Div. 26, 15, 30

Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
SEARCH-THEORETIC MODELS OF ORGANIZATION CONTROL BY BUDGETED MULTIPLE GOALS.
Management sciences research rept.,
by A. Charnes and A. C. Stedry. Mar 65, 53p
Rept. no. MSRP-32
Contracts Nonr76024, Nonr122810,
Projs. NR047 048, NR047 021

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Management control systems, Mathematical models), (*Search theory, Mathematical models), (*Budgets, Control), Optimization, Decision theory, Operations research, Probability, Management engineering, Mathematical programming, Decision making, Theory.

Models of situations in which individuals are faced with multiple activities among which they must allocate their effort are postulated. Optimal allocations are found for four assumed motivational structures - profit maximization and three involving performance goals in each of the activities. Heuristic approximations to the optimal allocations are developed. Also, the relationships between the various motivation structures are explored. (Author)

AD-615 128 Div. 26
CFSTI Prices: HC$4.00 MF$1.00

SKF Industries, Inc., Philadelphia, Pa.
A BASIC STUDY OF THE SLIDING CONTACTS IN ROLLING BEARINGS.
Progress rept. no. 4, 17 Jan-16 Apr 65,
by C. J. Belsky, J. I. McCool, J. T. Walker, J. A. Kamenshine, and K. Tataiah. 16 Apr 65, 126p
Rept. no. AL65L032
Contract NOw64 0428c, Projs. 18 7, 19 1

Unclassified report

See also AD-611 378.

Descriptors: (*Roller bearings, Mechanics), (*Friction, Roller bearings), Motion, Loading (Mechanics), Tests, Lubricants, Torque, Velocity, Surface properties, Experimental data, Statistical analysis.

Kinematics of rollers in a cylindrical roller bearing were further investigated using two distance gages mounted at a spacing of 30 degrees central angle. The output from these probes was tape recorded, the signals sampled, the sample amplitudes digitized and computer processed. Averages and standard deviations were obtained of the skew angle under both probes, the axial roller position under both probes, and the axial displacement of the roller between the two probes. Correlation coefficients were calculated between skew angles under the first and second probes, and between skew angle under the first probe and axial motion of the roller between the two probes. From these data, the angular position and axial motion of the rollers was analyzed in the load zone entrance region. Over forty tests with three mineral oil and diester base lubricants were conducted on a two-ball tester, covering several speeds and varying loads, to determine conditions for the onset of smearing at the contact between a stationary and a rotating ball.

27. Propulsion Systems

AD-614 570 Div. 27, 8
CFSTI Prices: HC$3.00 MF$0.75

Bureau of Yards and Docks, Washington, D. C.
INSTALLATION AND MAINTENANCE HANDBOOK FOR INTERFERENCE SHIELDING OF INTERNAL COMBUSTION ENGINES.
Revised ed.
3 Jan 63, 57p NAVDOCKS P-278

Unclassified report

Rept. is revision of and supersedes NAVDOCKS-P-278 dated Jan 56.

Descriptors: (*Radio interference, Internal combustion engines), (*Electromagnetic shielding, Internal combustion engines), (*Internal combustion engines, Electromagnetic shielding), Handbooks, Instruction manuals, Installation, Manufacturing methods, Maintenance, Ignition systems, Spark plugs, Magnetos, Generators, Voltage regulators, Distributors, Coils, Radio frequency filters.

Unshielded internal combustion engines are one of the more potent sources of radio frequency interference when operated near antennas of receiving devices. The publication provides the information required to install, test, and maintain suppression shielding on the engines operated in such sensitive areas.

AD-614 626 Div. 27
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
MEASUREMENTS AND CORRELATION OF HEAT TRANSFER IN A SOLID PROPELLANT ROCKET NOZZLE.
Final rept.
by Roland E. Lee. 30 Nov 64, 49p NOL TR-64-163

Unclassified report

Descriptors: (*Rocket motor nozzles, Heat transfer), (*Heat transfer, Rocket motor nozzles), Rotor motors (Solid propellant), Heating, Partial differential equations, Experimental data, Differential equations, High-temperature research, Two-dimensional flow, Turbulent boundary layer.

The two-dimensional transient heat flow in a conical De Laval nozzle subject to a solid propellent exhaust flow was investigated. Local temperature and heat transfer rates at the internal surface were determined. It was found that an analysis assuming one-dimensional heat flow gave essentially the same results as the two-dimensional analysis. Local heat transfer coefficients were compared with the predictions from a detailed solution of the turbulent boundary layer flow and with the widely used empirical relation of Bartz. The present results were in better agreement with the boundary layer solution, particularly in the prediction of the peak value at the nozzle throat. The present rocket nozzle data expressed in Nusselt number form showed very good agreement with the steady state heat transfer data observed with a water-cooled copper nozzle. On the basis of the present data plus the copper nozzle data a simple adjustment is derived to include the effects of compressibility and geometry in the conventional Nusselt-Reynolds number correlation. This adjustment decreases the scatter of experimental data by 43 percent. (Author)

AD-614 657 Div. 27, 10
CFSTI Prices: HC$1.00 MF$0.50

Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
PARAMETRIC STUDY OF ROCKET INSTABILITY.
Final rept.,
by M. J. Zucrow. 17 Feb 65, 8p
Grant AF AFOSR62 360

Unclassified report

Descriptors: (*Rockets, Stability), (*Rocket motors, Combustion), (*Combustion, Rocket motors), Liquid rocket propellants, Gaseous rocket propellants, Air, Gases, Oxidizers, Fuel injection, Vaporization, Injection, Combustion chambers, Reynolds number, Theory, Pressure, Cylindrical bodies, Oscillation.

Research was conducted to determine those dimensionless parameters that may be employed as criteria for predicting the stability of combustion in a thrust chamber. UNMIXED GASEOUS PROPELLANTS: Unmixed propellants with impinging jet injectors yield combustion pressure oscillation similar to that obtained for premixed propellants with respect to fuel reactivity. BIPHASE PROPELLANTS (LIQUID FUEL-GASEOUS OXIDIZER): Investigations were conducted to determine the effects of (1) both the air and propellant injection velocities, chamber pressure, and fuel-air ratio on the steady-state operating characteristics of a rocket motor, and (2) selected parameters on propellant vaporization rate. CORRELATION OF RESULTS WITH SIMILARITY VARIABLES: Dimensionless parameters were derived that are sensitive to the occurrence of small amplitude pressure oscillations in the burning gaseous medium in a cylindrical combustion chamber. THEORETICAL ANALYSIS: An analysis was completed of the longitudinal combustion pressure oscillations for one model of the combustion zone.

AD-614 913 Div. 27, 1
CFSTI Prices: HC$3.00 MF$0.75

Allegheny Ludlum Steel Corp., Brackenridge, Pa.
METALLURGICAL EVALUATION OF FAILED AIRCRAFT STAINLESS STEEL EXHAUST SYSTEM COMPONENTS.
Technical rept.,
by T. H. McCunn. Jan 65, 65p
Contract FA NAF176
FAA-ADS 28

Unclassified report

Descriptors: (*Exhaust systems, Failure (Mechanics)), (*Aircraft engines, Exhaust systems), (*Stainless steel, Exhaust systems), Metallography, Chemical analysis, Microstructure, Oxidation, Corrosion, Fracture (Mechanics), Vibration, Thermal stresses.

A total of twelve samples from small aircraft exhaust systems were investigated metallurgically. Three of the samples, referred to as baseline, were from new, unused systems. These were examined metallographically for general microstructural characteristics and chemically analyzed. The other samples were from systems which had failed while in flight operation. These samples were examined metallographically and analyzed chemically to determine the cause(s) of failure. The samples were representative of a number of designs and different types of failures which have been encountered. Practically all the materials were AISI Type 321, a titanium-stabilized austenitic stainless steel. Examination of the baseline samples showed microstructures of the base metal, weld and weld heat-affected zone to be normal. Four samples failed because of excessive oxidation or high temperature

corrosion due apparently to uneven flow of gases, resulting in local overheating, carburization, and probably more rapid attack by the products of combustion, especially lead compounds. Four other samples from mufflers of similar design and one sample of a different design showed fatigue cracks. The failures were attributed to excessive vibrational and/or thermal stresses in the presence of abrupt changes in section size and likely locations for crack initiation. (Author)

AD-614 940 Div. 27
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CALCULATION OF AXIALLY SYMMETRIC VORTEX FLOW OF AN INVISCID COMPRESSIBLE FLUID IN RADIAL TURBOMACHINES,
by Ya. A. Sirotkin. 15 Apr 65, 28p FTD-MT-64-457
TT 65-62129
Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie n3 p16-28 1963.

Descriptors: (*Axial-flow turbines, Axially symmetric flow), Vortices, Friction, Incompressible flow, Thermodynamics, Partial differential equations, USSR.

The formulation of a direct axially symmetric problem for a compressible fluid is considered taking into account losses due to friction and mixing. This problem is set up as a boundary value problem in a channel.

AD-614 961 Div. 27, 9
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
GREAT-PRESSURE-DROP GAS EJECTOR WITH ADDITIONAL NOZZLE,
by Yu. N. Vasil'ev. 14 Apr 65, 6p
FTD-TT-64-1198
TT 65-62150
Unclassified report

Unedited rough draft trans. of Russian patent 134804, appl. 664925/25, Apr 28, 1960.

Descriptors: (*Jet pumps, Patents), (*Air ejectors, Nozzles), Supersonic nozzles, Vacuum, Ejection, USSR.

The object of the invention is a gas ejector having great drops or jumps in pressure with a supplementary nozzle of low-pressure gas and a narrowing or insufficiently expanded supersonic nozzle of high-pressure gas. For the purpose of obtaining a higher vacuum with successive pumping out of gas from one vessel or for assuring the possibility of simultaneously pumping out of gases with different pressures from two vessels, the cut of the supplementary narrowing nozzle of low-pressure gas is located in the zone of sudden expansion of the high-pressure gas flow, where as a result of the two-dimensional character of the flow the static pressure is considerably lowered. The supplementary nozzle has axial shifting and is put into the working position after accomplishing the supersonic flow of the high-pressure gas jet at the initial part of the mixing chamber. (Author)

AD-615 038 Div. 27, 10
CFSTI Prices: HC$4.00 MF$0.75

Catholic Univ. of America, Washington, D. C. School of Engineering and Architecture.
EXPERIMENTAL STRAIN AND STRESS ANALYSIS OF SOLID PROPELLANT ROCKET MOTORS.
Interim rept. no. 6,
by A. J. Durelli. Mar 65, 116p
Contract Nonr224906, Proj. 4 147 05
Unclassified report

Rept. on Development of Experimental Stress Analysis Methods to Determine Stresses and Strains in Solid Propellant Grains.
See also AD-419 862.

Descriptors: (*Rocket motors (Solid propellant), Strain (Mechanics)), Rocket propellant grains, Rocket cases, Reviews, Stresses, Mathematical analysis, Rocket models, Loading (Mechanics), Test methods, Model tests, Models (Simulation), Test equipment.

A review is made of the methods used to strain-analyze solid propellant rocket motor shells and grains when subjected to different loading conditions. The review includes methods directed at the determination of strains in actual rockets and also at the determination of strains in rocket models. The surveyed methods include two- and three-dimensional photo-elasticity, brittle coatings, electrical strain gages, moire, grids, etc. (Author)

AD-615 143 Div. 27, 4, 9
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
CHEMICAL KINETICS AND ROCKET NOZZLE DESIGN,
by F. J. Krieger. 20 Sep 51, 28p Rept. no. P-237
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Rocket motor nozzles, Design), (*Nozzle gas flow, Reaction kinetics), (*Reaction kinetics, Nozzle gas flow), Adiabatic gas flow, Shifting equilibrium flow, Chemical reaction, Chemical equilibrium, Thermodynamics, Iterative methods, Differential equations, Mathematical analysis, Recombinationreactions, Convergent divergent nozzle.

The effect of chemical kinetics on rocket nozzle design was investigated for the particular case of hydrogen gas flowing adiabatically through a typical rocket nozzle having a chamber-to-throat-area ratio of 2 to 1. For comparative purposes the following types of flow were considered: (a) constant composition (frozen equilibrium), (b) instantaneous chemical equilibrium (shifting equilibrium), and (c) kinetic chemical equilibrium. A stepwise iteration process was employed to perform the integration of the differential equation in case (c). In each case the gas entered the nozzle at a temperature of 3500K and a pressure of 20 atm and was allowed to expand isentropically to an exhaust pressure of 1 atm. The results for a mass flow rate of 1000 gm/sec are presented. The instantaneous equilibrium flow assumption not only gives a higher specific impulse, but also requires a larger nozzle than either the kinetic or the constant composition flow assumption. The kinetic equilibrium flow resluts are intermediate between those for instantaneous equilibrium flow and those for constant composition flow, the relative position depending on the magnitude of the reaction rate which governs the kinetic equilibrium. (Author)

AD-615 187 Div. 27, 9

Polytechnic Inst. of Brooklyn, Farmingdale, N. Y. Propulsion Research Lab.
LONGITUDINAL WAVE PROPAGATION IN LIQUID PROPELLANT ROCKET MOTORS,
by Samford S. Hammer and Vito D. Agosta. 30 Jun 64, 3p
Contract AF49 638 1263
AFOSR 65-0573

Unclassified report

Pub. in A I A A Journal v2 n11 p2042-4 Nov 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Rocket motors (Liquid propellant), Acoustics), (*Mechanical waves, Propagation), Pressure, Attenuation, Gas flow, Oscillation, Rocket motor nozzles.

The note presents some recent experimental data on wave-shape behavior in a liquid rocket motor in addition to measurements of the effect of Mach number on the frequency of wave propagation. (Author)

28. Psychology and Human Engineering

AD-614 595 Div. 28, 15, 30
CFSTI Prices: HC$2.00 MF$0.50

Psychometric Lab., Univ. of North Carolina, Chapel Hill.
RESEARCH AND DEVELOPMENT FOR QUANTIFYING PROCESSING OF PROBABILISTIC (UNCERTAIN) DATA.
Final rept. for 1962-1964,
by William H. Wynn. Dec 64, 28p
Contract AF19 628 1610, Proj. 4690, Task 469003
ESD TDR-65-162
Unclassified report

Descriptors: (*Decision theory, Decision making), (*Decision making, Mathematical models), Psychometrics, Behavior, Memory, Performance (Human), Learning, Test construction (Psychology), Game theory, Probability, Data processing systems, Optimization.

Research in decision making is described, with emphasis on the quantification of processing of probabilistic (uncertain) data, undertaken in the Psychometric Laboratory, University of North Carolina, from 1962 to 1964. Relevant administrative information is given, general objectives and findings of the research are described, and abstracts of papers reporting research conducted are provided.

AD-614 613 Div. 28, 16, 6
CFSTI Prices: HC$3.00 MF$0.75

TRACOR, Inc., Austin, Tex.
BINAURAL INTERACTION.
Summary rept. for 1 Apr 64-1 Apr 65,
by Bruce H. Deatherage. 29 Apr 65, 54p
TRACOR 65-181-U
Contract Nonr419300
Unclassified report

Descriptors: (*Auditory perception, Psychoacoustics), (*Psychoacoustics, Thresholds (Physiology)), (*Hearing, Auditory signals), Psychophysiology, Ear, Stimulation, Noise, Intensity, Signal-to-noise ratio.

The two experiments reported here are concerned with detectability as a function of interaural intensity differences. The experiments investigate masking in the N sub O, S sub m and N sub u, S sub m conditions and are concerned with a model of binaural interaction recently proposed by Jeffress. Other models are also suggested and are considered in order to account for the processes of binaural interaction. The second investigation reported here represents the first set of data collected in the newly-expanded psychophysical laboratories at TRACOR, Inc., and demonstrates the facility with which large amounts of data may be collected in a relatively short period of time. With this capability, detectability as a function of interaural intensity differences is being examined at other interaural noise correlations in the testing of models of binaural interaction.

AD-614 639 Div. 28, 23
CFSTI Prices: HC$1.00 MF$0.50

Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.
EFFECT OF SORTING PROCEDURE ON RANKING ERROR,
by Joe T. Hazel, Roger D. Bourdon, and Joseph M. Madden. Feb 65, 19p PRL TR-65-3
Proj. 7734, Task 773402
Unclassified report

See also AD-433 056.

Descriptors: (*Statistical analysis, Psychometrics), (*Psychometrics, Statistical analysis), Test construction (Psychology), Perception (Psychology), Air Force personnel, Aptitude tests.

Ranking is often used to provide criterion measures, although the effect of varied sorting procedures on ranking accuracy is unknown. This study investigates the efficiency of four sorting methods varying in degree of structure. Efficiency was defined in terms of the absolute difference between the judged rank order of a series of 50 irregularly shaped figures graduated by size, and the rank order of these figures based on their physical measurement. Analysis of these errors revealed that the procedure with the greatest restriction of freedom was significantly more inefficient than three less restrictive procedures. With simple stimuli, there appears to be an optimal degree of structure, beyond which ranking efficiency decreases. Comparison of present with previous evidence suggests efficiency of sorting procedure may vary as a function of task complexity. (Author)

AD-614 655 Div. 28, 1
CFSTI Prices: HC$3.00 MF$0.75

Life Sciences, Inc., Fort Worth, Tex.
STUDY OF ATTITUDE CHANGE TOWARD EQUIPMENT DESIGN. EFFECTS OF BRIEF EXPERIENCE VS. PRINTED COMMUNICATION ON ALTIMETER PREFERENCE.
Rept. for 1 Jun 63-Jun 64,
by W. G. Matheny and Philip K. Berger. Oct 64, 70p
Technical rept. no. TR-1
Contract Nonr409700
Unclassified report

Descriptors: (*Human engineering, Flight instruments), (*Attitudes, Pilots), (*Altimeters, Acceptability), Military personnel, Performance tests, Helicopters, Design, Analysis of variance.

The study was undertaken in an effort to gain a better understanding of the problem of resistance to change and how such resistance may be counteracted. The report discusses and illustrates some of the problems surrounding the methodology for investigating equipment preferences and reports the results of a preliminary investigation into procedures for producing changes in preference for new equipment. The selection of the altimeter as an instrument for use in the study was based upon the fact that suitable data was available as to the relative adequacy of the two instruments chosen and that the altimeter is an instrument around which controversy still revolves.

AD-614 682 Div. 28, 23, 30
CFSTI Prices: HC$4.00 MF$1.00

Psychometric Lab., Univ. of North Carolina, Chapel Hill.
DECISION-THEORETIC AND EMPIRICAL INVESTIGATION OF SOME PROBABILISTIC DISCRIMINATION LEARNING SITUATIONS,
by Raymond A. Wiesen. Jan 64, 120p
Contract AF19 628 1610, Proj. 4690, Task 469003
ESD TDR-64-192 Unclassified report

Descriptors: (*Learning, Decision making), (*Decision making, Performance (Human)), Motivation, Behavior, Verbal behavior, Probability, Game theory, Performance tests, Feedback, Experimental data, Theory, Analysis.

A decision-theoretic analysis and experiment of three related choice situations is presented. The first situation is a standard probabilistic discrimination learning task. Each trial begins with the presentation of one of a set of stimuli. The subject must choose between two response alternatives to predict which of two events will occur on the trial. The second situation arises when the conditional probabilities, i.e., the probabilities of the stimuli given the events, are introduced to the subject at the beginning of the experiment. The third situation is like the second except that the subject is not told which event occurs on each trial. One group of subjects was run in each situation with the overall relative frequency of one event equal to .80. The performance of the subjects in the first and second situations was virtually identical, while the performance of the subjects in the third (non-feedback) was somewhat worse. The comparisons of the choice proportions for the first and second groups indicated that subjects in the second group did not integrate information concerning the overall relative frequencies of events and conditional probabilities. A large proportion of subjects in the third (non-feedback) group made every choice in agreement with the assumption that the overall relative frequency of one event was one-half. (Author)

AD-614 683 Div. 28, 15, 30
CFSTI Prices: HC$1.00 MF$0.50

Psychometric Lab., Univ. of North Carolina, Chapel Hill.
BAYESIAN DECISION THEORY, GAME THEORY AND GROUP PROBLEM SOLVING,
by David M. Messick. Oct 64, 19p Rept. no. 35
Contract AF19 628 1610, Proj. 4690, Task 469003
ESD TDR-64-603

Unclassified report

Descriptors: (*Decision theory, Psychometrics), (*Game theory, Decision making), (*Psychometrics, Mathematical models), Group dynamics, Social psychology.

The concepts of the 'ideal' information processor and rational decision maker are applied to a typical problem in social psychology--that of group problem solving. The structure of the selected task is seen to be that of a nonzero sum game. A strategy is derived and is shown to be the equivalent of the Nash solution to the game. The notion of level of aspiration is discussed and defined within the analysis and two theorems are proved relating level of aspiration to type of group decision strategy employed. (Author)

AD-614 684 Div. 28, 30
CFSTI Prices: HC$2.00 MF$0.50

Psychometric Lab., Univ. of North Carolina, Chapel Hill.
ESTIMATION OF CONTINUOUS SUBJECTIVE PROBABILITY DISTRIBUTIONS IN A SEQUENTIAL DECISION TASK,
by Amnon Rapoport. Oct 64, 26p Rept. no. 39
Contract AF19 628 1610, Proj. 4690, Task 469003
ESD TDR-64-607

Unclassified report

Descriptors: (*Decision making, Game theory), (*Probability, Decision making), Decision theory, Statistical analysis, Sequential analysis.

A range betting method (RBM) for measuring continuous subjective probability distributions is presented. Predictions derived from the method are tested in a computer-controlled sequential decision making task. In particular, twenty-two undergraduate students participated individually in the task. The subjects were asked occasionally to place a wager upon the range of an unknown value of P, $0 < P < 1$, generated by an LGP-30 computer. In addition, the subjects predicted the exact value of P by typing a number on a Flexowriter, and then estimated the value of P after obtaining information about its value. The information was given in the form of n values ($1 < n < 20$) of 0's or 1's generated by a binomial distribution with mean P and printed on the Flexowriter in front of the subject. Predicted decisions were derived both from the RBM method and from a relatively simple confidence limits' model. The subjects' estimates of the range boundaries were compared to the predicted values from both models. In both comparisons the results indicated a regression effect and a block-to-block tracking behavior. Attempts to compare two independent measures of the same subjective probability distribution were unsuccessful. (Author)

AD-614 685 Div. 28, 30
CFSTI Prices: HC$1.00 MF$0.50

Psychometric Lab., Univ. of North Carolina, Chapel Hill.
SEQUENTIAL INFORMATION SEEKING: AN OPTIMAL STRATEGY AND OTHER RESULTS,
by David M. Messick. Oct 64, 17p Rept. no. 42
Contract AF19 628 1610, Proj. 4690, Task 469003
ESD TDR-64-605

Unclassified report

Descriptors: (*Decision making, Optimization), (*Sequential analysis, Decision making), Decision theory, Sampling, Probability, Binomials.

This paper presents an optimal strategy for sequential sampling from binomial distributions. The strategy presented is general in that it is a 'multi-action' rather than a two-action procedure. While the major task is to estimate the proportion, p, of 'successes' in a hypothetical, infinite population of binary observations, it is assumed that the decision maker is only concerned with which of a set of mutually exclusive and exhaustive subsets of the unit interval contains p. The derived strategy maximizes the decision-maker's gain without regard to error probabilities. The important variable in determining a rule for ceasing to look at new data and making a decision is found to be the expected probability of being correct. The criterion involves only the economic aspects of the situation. A 'no information' theorem is presented which shows that under some circumstances when a 'success' or a 'failure' on a given trial are equally probable, the probability of being correct after making the observation is identical to the probability of being correct before the observation was taken. Finally, an appealing derivation of the Beta-binomial probability function is given which suggests a more tractable computational procedure for the distribution and which illuminates its limiting distribution. (Author)

AD-614 708 Div. 28
CFSTI Prices: HC$1.00 MF$0.50

Psychometric Lab., Univ. of North Carolina, Chapel Hill.
SEQUENTIAL INFORMATION SEEKING: EFFECTS OF THE NUMBER OF TERMINAL ACTS AND PRIOR INFORMATION,
by David M. Messick. Oct 64, 14p Rept. no. 41

Contract AF19 628 1610, Proj. 4690, Task 469003
ESD TDR-64-606

Unclassified report

Descriptors: (*Decision making, Tests), Decision theory, Sequential analysis, Combinatorial analysis, Binomials, Statistical analysis.

An experiment was conducted by means of a digital computer in which 54 human Ss were faced with the task of sampling from a hypothetical binomial universe in which a proportion, p, of all observations were 'top quality.' Ss sampled the universe sequentially, stopping after some number of observations had been made to make a terminal decision by selecting the one of the S's mutually exclusive and exhaustive subsets of the unit interval which S believed contained p. The four experimental treatments were defined by the four combinations of the two decision partitions of the unit interval, one involving 3 possible terminal acts, the other having 5 alternatives, and the two prior frequency distributions, one a rectangular distribution over (0 - 1), the other being negatively skewed. Analysis of variance of the number of predecision observations taken indicated a) significant individual differences; b) significant S by treatment interactions; c) differences attributable to the decision partitions with more observations being taken in the 5-act case than in the 3-act case; and d) no effect of prior frequency distributions, but a tendency to take more observations in the second 16 trials than in the first 16. (Author)

AD-614 713 Div. 28, 31
CFSTI Prices: HC$3.00 MF$0.50

Naval Medical Research Lab., New London, Conn.
AN INVESTIGATION OF THE RED ILLUMINATION OF THE SUBMARINE CONNING TOWER.
Interval rept. no. 1,
by W. S. Verplanck. 15 Mar 46, 51p Rept. no. 102
Proj. X519

Unclassified report

Descriptors: (*Submarines, Illumination), (*Illumination, Adaptation (Physiology)), Vision, Colors, Performance tests, Submarine periscopes, Targets, Position finding, Sky brightness, Stimulation, Thresholds (Physiology), Human engineering, Tables.

A series of experiments on conning tower illumination was undertaken to determine the extent to which laboratory findings on the effect of dim red light upon night vision may be duplicated in a practical situation. Such experiments were considered necessary not only because available data on dark adaptation indicated that some decrement in night vision performance might be expected, but also such a decrement, although small, has been found in the absolute visual threshold. This decrement, experimentally induced by a uniformly illuminated field, and measured by a precise technique, might be expected to appear in a non-uniformly illuminated space such as a conning tower, when the performance in question is one which is affected by many other factors than the state of the adaptation of the retina. It is the present problem to determine whether or not it does. A performance simulating the visual task of an officer at the periscope was therefore measured under three conditions of conning tower illumination. This performance was the detection of the position of a target in the dimly illuminated field of a simulated periscope.

AD-614 735 Div. 28

North Dakota State Univ., Fargo.
COGNITIVE DISSONANCE AND THE EFFECTIVENESS OF PERSUASIVE COMMUNICATIONS,
by James O. Whittaker. 1962, 11p
Grant AF AFOSR62 188
AFOSR 65-0595

Unclassified report

Pub. in The Public Opinion Quarterly v28 p547-55 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Social communication, Effectiveness), (*Public opinion, Decision making), Social psychology, Psychometrics, Groups dynamics, Applied psychology, Attitudes, Theory.

The report tends to show that maximum change usually comes, not when the discrepancy is greatest or smallest between policy advocated and public opinion, but at some intermediate point, dependent upon the position of the audience. (Author)

AD-614 743 Div. 28, 16

Oxford Univ. (England).
THE ROLE OF CROSSED AND UNCROSSED OPTIC NERVE FIBERS IN THE VISUAL DISCRIMINATION OF SHAPE BY RATS,
by W. R. A. Muntz and N. S. Sutherland.
1964, 9p
Contract N62558 253

Unclassified report

Pub. in Journal of Comparative Neurology v122 n1 p69-77 Feb 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Optic nerve, Psychophysiology), (*Visual acuity, Learning), (*Learning, Adaptation (Physiology)), Nerve fibers, Configuration, Rats, Training, Retraining, Eye, Geometric forms, Great Britain.

Unilateral lesions were made to the striate cortex in 12 rats by applying heat to the exterior surface of the skull. If the striate cortex is destroyed unilaterally in this way, it is possible to restrict visual input to crossed or uncrossed fibers in the optic pathway by covering up one or the other eye. Using this method it was shown that rats can learn a simple visual discrimination using uncrossed fibers only. The results suggest that performance on a difficult discrimination is not as good when using uncrossed fibers only as when using crossed only. If a habit is learned with crossed fibers only or uncrossed only, it transfers when only the opposite fibers to those used in training are available. (Author)

AD-614 752 Div. 28, 16

Indiana Univ., Bloomington.
GASTROINTESTINAL REACTIONS TO RESPONSE-CONTINGENT STIMULATION,
by Janet H. Fedor and Roger W. Russell. 16 Oct 64, 22p
Contract DA49 193MD2063

Unclassified report

Pub. in Psychological Reports Monograph Supplement 1-v16 p95-113 1965(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gastrointestinal system, Reaction (Psychology)), (*Stress (Psychology), Gastrointestinal system), Stimulation, Psychophysiology, Reflexes, Noise.

Three parameters of the electrophysiological manifestations of gastrointestinal activity were studied: amplitude, displacement, and peak response time. Analyses of the

results show that the mean amplitude of gastrointestinal activity increased significantly only when avoidance of the aversive stimulus was unsuccessful; during successful trials the amplitude remained at pre-task baseline levels. This differential reaction was strikingly apparent when the outcome of S's response differed on successive trials; when both trials of a pair involved the same response contingencies, i.e., either successful or unsuccessful avoidance, gastrointestinal reactions were not significantly different; but large and very significant changes occurred when pairs of trials involved different response contingencies. The results of the present experiment when considered in relation to those provided by earlier studies suggest that the differences in effects of response-contingent and of non-response-contingent conditions cannot be accounted for in terms of the physical characteristics of the aversive stimulus, of sensory processes per se, or of motor output.

AD-614 793 Div. 28, 30
CFSTI Prices: HC$5.00 MF$1.00

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
DEVELOPMENT OF TECHNIQUES FOR THE AUTOMATIC CONTROL OF EXPERIMENTS IN A PSYCHOLOGY LABORATORY.
Final rept.
Feb 65, 152p Rept. no. BBN-1221
Contract AF19 628 296, Proj. 4690, Task 469002
ESD TDR-65-175

Unclassified report

Descriptors: (*Psychology, Instrumentation), (*Digital computers, Control systems), Psychoacoustics, Decision making, Human engineering, Pattern recognition, Display systems, Reaction (Psychology), Experimental data, Behavior, Automatic, Design.

The report details the development of methods for using a digital computer (the Digital Equipment Corporation PDP-1) to control apparatus and experimental procedures in psychological experiments. It describes the design of equipment for a multi-subject display system and a psychoacoustic laboratory system. An experiment illustrating the use of the system is included. (Author)

AD-614 825 Div. 28, 18
CFSTI Prices: HC$3.00 MF$0.75

Texas Christian Univ., Fort Worth.
MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANALYSIS OF SOCIOMETRIC INDICES OF GROUP INTERACTION AT ALASKAN AC AND W SITES,
by W. B. Manning and S. B. Sells. Jul 63, 55p
Contract AF41 657 323, Proj. 8246, Task 824602
AAL TDR-63-41

Unclassified report

Descriptors: (*Group dynamics, Military personnel), (*Military personnel, Alaska), (*Sociometrics, Military personnel), Air force personnel, Stress (Psychology), Factor analysis, Performance (Human), Military organizations, Radar operators, Air traffic controllers.

Quantitative indices of group interaction were developed using a sociometric questionnaire for interpersonal work and social contacts, administered to 1853 Air Force personnel, comprising 123 work groups at 16 remote AC and W sites in Alaska. Nineteen sociometric indices, corrected statistically for group size were intercorrelated and analyzed by factor analysis and cluster analysis, yielding eight factors, six of which conform to the six clusters independently identified. The remaining two factors were each specific to a single variable. The factors were provisionally identified as follows: I. Interaction Extent, II. Conformity to Command Structure, III. Cohesiveness of Work Groups, IV. Formal Cooperation I, VI. Interactions Outside Work Group, and VII. Formal Cooperation II. Factors V and VIII, identified by single variables, were not interpreted. These dimensions of group interaction may be useful in comparing groups differentiated on the basis of membership, organization, structure, environmental context, or performance criteria. (Author)

AD-614 860 Div. 28, 30

North Carolina Univ., Chapel Hill.
SEQUENTIAL DECISION-MAKING IN A COMPUTER-CONTROLLED TASK,
by Amnon Rapoport. 1 Oct 63, 24p
Contract AF19 628 1610

Unclassified report

Pub. in Journal of Mathematical Psychology v1 n2 p351-74 Jul 1964 (Copies available only to DDC users).

Descriptors: (*Decision making, Psychology), Computers, Mathematical models, Simulation, Statistical analysis, Probability, Communication theory.

Twenty-four undergraduate college students participated individually as subjects in a computer-controlled task, intended as an investigation of decision-making under uncertainty in a nonstationary environment. Each subject was required on every trial to predict the value of an unknown P, 0 < or = to P < or = to 1.00, and then to estimate its value after having received partial information about it from a computer. Each P value, for 120 trials, was generated by one of three different beta distributions. A model derived from Bayesian decision theory is presented, tested, and partially confirmed. A learning model was constructed and tried in a computer simulation of the subjects. Implications concerning information seeking and use of computers in experiments are discussed briefly. (Author)

AD-614 863 Div. 28

California Univ., Berkeley.
UNLEARNING AS A FUNCTION OF THE RELATIONSHIP BETWEEN SUCCESSIVE RESPONSE CLASSES,
by Leo Postman, Geoffrey Keppel, and Karen Stark.
7 Jan 64, 8p
Contract Nonr22290

Unclassified report

Pub. in Journal of Experimental Psychology v69 n2 p111-8 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Learning, Reaction (Psychology)), Retention, Memory, Interference, Inhibition.

The study tests the assumption that in the A-B, A-C transfer paradigm the unreinforced evocation of covert or overt first-list responses during the acquisition of the second list results in the unlearning of the first-list associations. In an RI design using the A-B, A-C paradigm the work groups received interpolated trials on a second list in which the type of responses either remained the same as in List 1 or was different. Free recall of List 1 associations revealed greater RI and more interlist intrusions for the conditions using the same type of responses. It appears that the degree of unlearning depends upon the frequency with which first-list responses are elicited during second-list learning. These results are consistent with the position that unlearning is a process sharing some of the functional characteristics of experimental extinction. (Author)

AD-615 042 Div. 28
CFSTI Prices: HC$1.00 MF$0.50

Institute for Behavioral Research, Univ. of Maryland, College Park.
CROSS-CULTURAL INVESTIGATION OF SOME FACTORS IN PERSUASION AND ATTITUDE CHANGE,
by Elliott McGinnies. Mar 65, 24p
Technical rept. no. TR-7
Contract Nonr372001, Proj. NR171 250
Unclassified report

See also AD-612 649.

Descriptors: (*Attitudes, Public opinion), (*Personality, Perception (Psychology)), Social communication, Culture, Students, Psychometrics, Sociometrics, Decision making, Cold war, Japan, Cuba, Factor analysis, Verbal behavior, Motivation.

In order to determine the effect of communication content upon perceptions of a speaker, data from a questionnaire used in 3 previous experiments designed to measure the reactions of Japanese University students to persuasion on the topics of the Cold War, the Cuban Crisis, and proposed visits by American nuclear-powered submarines were further analyzed. The questionnaire consisted of 9 pairs of bipolar adjectives describing the communicator's personality. The analysis considered the extent to which each of the adjectives was selected to describe the speaker. The results showed several striking variations in evaluation of the speaker under the different conditions, indicating that the content of the communications had an overriding influence on how he or she was perceived. In general, the results indicate that impressions of an unseen communicator are influenced more by subject matter than by his manner of speaking. Where salient political attitudes of Japanese students are involved, reactions to the communicator may be an effective indirect method of gaining information about responses to a persuasive communication that are not revealed in attitude measures. (Author)

AD-615 051 Div. 28, 26, 30

Aerospace Medical Research Labs., Wright-Patterson AFB, Tex.
JOY STICK VS. MULTIPLE LEVERS FOR REMOTE MANIPULATOR CONTROL.
Final rept. for Mar-Jul 63,
by Billy M. Crawford. Apr 65, 12p AMRL TR-65-76
Proj. 7184, Task 718407
Unclassified report

Pub. in Human Factors p39-48 Feb 1964 (Copies available only to DDC users).

Descriptors: (*Remote control systems, Positioning devices (Machinery)), (*Operators (Personnel), Performance (Human)), Control systems, Human engineering, Effectiveness, Tests.

Two modes of control, a joy stick and a multiple-lever system for the same remote manipulator were investigated experimentally. Operator performance was measured by task time and by errors made in initiating control movements. The results show superior performance with the joy stick control. However, with practice the effectiveness of the multiple-lever control tended to approach that of the joy stick. No significant correlations between performance with either control and Minnesota Rate of Manipulation Test scores were obtained. A discussion of human engineering implications is included. (Author)

AD-615 101 Div. 28, 23
CFSTI Prices: HC$4.00 MF$1.00

Wakoff Research Center, Staten Island, N. Y.
PSYCHOSOCIAL FACTORS IN MILITARY DEVIANCE,
by Sheldon Blackman, Wallace Mandell, and Kenneth M. Goldstein. Mar 65, 134p
Contract DA49 193MD2538
Unclassified report

Descriptors: (*Military personnel, Social psychology), (*Social psychology, Military personnel), Adjustment (Psychology), Group dynamics, Psycho metrics, Sociometrics, Army training, Military psychology, Behavior.

This study is conceived of as the first of a group of studies designed to explore systematically both the psychosocial conditions under which deviant behavior may occur in the military and the methods of preventive intervention which could be used to prevent deviance. A model which related the occurrence of deviance to person variables, environmental variables, and precipitating events is presented. Three types of basic training squads were investigated: 44 squads containing an individual who had been AWOL for more than 72 hours, 30 squads containing an individual referred to a MHCS (Mental Hygiene Consultation Service) for unsuitability discharge, and 44 control squads containing an individual who had been hospitalized for an upper respiratory infection. It appears that both person and environmental variables are related to the occurrence of deviant behavior. Events perceived as precipitating the emergence of deviant behavior may be isolated.

AD-615 102 Div. 28
CFSTI Prices: HC$2.00 MF$0.50

Princeton Univ. N. J.
THE MEASUREMENT OF CONCEPTUAL DIMENSIONS,
by H. M. Schroder and S. Blackman. 1965, 50p
Technical rept. no. TR-16
Contract Nonr185812, Proj. NR171 055
Unclassified report

Prepared in cooperation with Wakoff Research Center, Staten Island, N. Y., Contract DA49 193MD2538
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Attitudes, Measurement), (*Psychometrics, Attitudes), Decision making, Communication theory, Personality, Social psychology, Behavior.

The purpose is to examine the value of the technique of multidimensional scaling - MDS - for the objective measurement of dimensionality and combinatory processes involved in attitudes. The MDS model assumes that in making judgments, people may combine one, two, or more attributes of objects. In ordinary psychological scaling, persons are asked to judge objects on one attribute at a time. In the MDS method, the bases or attributes to be used by the subject in making judgments are not given. The object of the technique is to discover the attributes involved. Individuals were given a range of stimuli in a particular stimulus domain (e.g., eleven nations). All pairs of stimuli were listed (e.g., Britain - France) and the subject was asked to rate their similarity on a scale extending from 1 (very similar) to 9 (very dissimilar). This produces a matrix of N(N-1)/2 judgments for any number of stimuli. The purpose of the analysis is to uncover the number and characteristics of the attributes (dimensions) employed by

subjects in making these global judgments about complex objects which may vary simultaneously along several dimensions. It is shown that if all the mutual interpoint distances (similarity-dissimilarity judgments) among a set of points are known, a Euclidean space may be derived. The order to the dimensionality of the space, as well as the projection of the points on these orthogonal dimensions, can be found.

AD-615 119 Div. 28, 15
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
BAYES ESTIMATION FOR SOME STIMULUS SAMPLING MODELS,
Technical memo.,
by Robert E. Dear. 22 Feb 65, 46p
Rept. no. TM-1734/002/00
Unclassified report

Descriptors: (*Learning, Statistical analysis), (*Conditioned reflex, Learning), Mathematical models, Distribution theory, Sampling, Probability.

In this paper, the author derives the joint Bayes estimators of the three structural parameters of the single-element stimulus-sampling model of learning when conjugate prior beta distributions over these parameters are assumed. These estimators are obtained for finite sample sequences in contrast to the other available estimation procedures for this model which are based on infinite sample sequences. Extension of the Bayes estimation procedures to a two-element stimulus-sampling model involving six structural parameters is also carried out. The completeness of the class of Bayes estimators for these two models is established. Computational problems in obtaining values of the Bayes estimates are discussed. Although the estimators are functions which involve ratios of products and sums of many terms involving complete beta functions suitable approximate evaluations of the estimators can easily be carried out on a large computer. (Author)

AD-615 159 Div. 28, 16
CFSTI Prices: HC$1.00 MF$0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
ON THE VALIDITY AND RELIABILITY OF THE AUTONOMIC LABILITY SCORE,
by Ardie Lubin, David J. Hord, and Laverne C. Johnson. Dec 64, 20p
Rept. nos. 64-20, MR005-12-2304
Grant NIMH MY5504, Proj. MR005 12 2304
Unclassified report

Descriptors: (*Psychometrics, Analysis of variance), (*Stimulation, Psychophysiology), Correlation techniques, Reliability, Measure theory.

The reliability and validity of the difference score are shown to be greater than, equal to, or less than that of the autonomic lability score depending primarily on whether Wilder's Law of Initial Value holds. Various measures of change such as percent gain, crossover point, slope, etc., are shown to be optimal measures for given situations. The blanket use of the autonomic lability score is questioned and flexible procedures for computing measures of change are recommended. (Author)

29. Quartermaster Equipment and Supplies

AD-614 824 Div. 29, 18, 20
CFSTI Prices: HC$3.00 MF$0.50

Western Regional Research Lab., Albany, Calif.
BULGUR WAFER AND ADJUNCTS FOR FALLOUT SHELTER RATIONS,
Annual rept. for Jul 63-Jun 64,
by Allan D. Shepherd, Darrell V. Beavers, Robert E. Ferrel, Robert J. Horvat, and Hawkins Ng. Jan 65, 52p
Contract OCD OS62 54, Proj. 1300, Task 1310
Unclassified report

Descriptors: (*Radioactive fallout, Shelters), (*Shelters, Radioactive fallout), (*Food, Shelters), Wheat, Storage, Life expectancy, Stability, Taste, Oxidation, Decomposition, Chemical analysis, Tests, Condiments, Civil defense system.

Long-term (five-year) studies of the storage life of bulgur wafers and adjuncts (food to serve with the wafers to vary fall out shelter menus) are in progress. Taste panel results after 16 months of storage indicate that the shelf-life of bulgur wafers may be increased by nitrogen-gas packing and by use of malt sirup rather than corn sirup in the formulation. Chemical-physical analyses are being made on duplicate samples of wafers in a search for a test that correlates with organoleptic evaluation. Trends are not yet well enough developed to permit meaningful correlation. Identify of components of the vapors from rancidifying bulgur and from a model compound, methyl linoleate (linoleic acid comprises more than half of the fatty acids in wheat), is being sought by means of a new technique which combines gas-liquid chromatography and rapid-scan mass spectrometry. Wheat products prepared by hot-air puff-drying and by gun puffing have been evaluated as wafer ingredients potentially cheaper than regular puffed bulgur. Material obtained by hot-air puff-drying shows some promise as a suitable alternate wheat ingredient for wafers. Several new adjuncts have been proposed, including a pectin jelly prepared with cold water to replace the originally developed jellies requiring hot water for preparation. (Author)

AD-614 908 Div. 29, 18, 20, 26
CFSTI Prices: HC$7.00 MF$2.00

Advance Research, Inc., Needham Heights, Mass.
CRITICAL INDUSTRY REPAIR ANALYSIS, FOOD INDUSTRY,
Final rept. for Jun 63-Apr 65,
by Olaf H. Fernald and Thomas D. Bull. Apr 65, 375p
Rept. no. CIRA-3
Contract OCD OS62 257, Task 3311A
Unclassified report

See also AD 419 518.

Descriptors: (*Civil defense systems, Food), (*Food, Industrial production), (*Nuclear explosion damage, Industrial plants), (*Industrial plants, Nuclear explosion damage), (*Nuclear warfare, Food), Explosion effects, Vulnerability, Analysis, Flour, Meat, Sea food, Fruits, Packaging, Transportation, Food dispersing, Fuels, Radioactive fallout, Storage.

The American food industry is analyzed in terms of vulnerability and postattack repair. Processing plants in eight specific segments of the industry are selected on the basis of essentiality and vulnerability: flour, yeast, sugar, citrus fruit, edible oils, fish, meat, and packaging (cans and cartons). Vulnerabilities of the plants vary by a whole order of magnitude. The most vulnerable plant faces total destruction at a relatively low 1.2 psi blast overpressure, and the least vulnerable plant is still repairable after a blast of up to 12.0 psi. The older, more massively built plants are generally least vulnerable, hence present the fewest repair problems at any given blast level. There are two general conclusions. First, a severe shortage of both raw and processed food stuffs is improbable, because food manufacturers are both numerous and geographically dispersed. Second, food in one form or another, including ample reserves in the form of stored, surplus commodities, will be available but must be transported. An adequate supply of petroleum is essential to insure the transporation which will provide the food supply. (Author)

AD-614 910 Div. 29
CFSTI Prices: HC$1.00 MF$0.50

Massachusetts Univ., Amherst. Dept. of Food and Nutrition.
COMPILATION OF A BIBLIOGRAPHY ON THE WHOLESOMENESS OF IRRADIATED FOODS,
by Elwood F. Reber, Krishan Raheja, and Dorothy Davis. 1964, 25p
Contract DA49 193MD2571
Unclassified report

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Descriptors: (*Irradiated foods, Bibliographies), Beef, Vegetables, Chickens, Fishes, Eggs, Fruits, Pork, Potatoes, Milk, Nutrition, Purification, Preservation, Radiation effects.

30. Research and Research Equipment

AD-614 579 Div. 30, 15
CFSTI Prices: HC$1.00 MF$0.50

Operations Research Center, Univ. of Calif., Berkeley.
OPERATIONS RESEARCH IN THE WORLD OF TODAY AND TOMORROW,
by George B. Dantzig. Jan 65, 12p ORC-65-7
Contracts Nonr22283, Nonr365602

Unclassified report

Descriptors: (*Computers, Operations research), (*Operations research, Computers), Decision making, Pattern recognition, Control systems, Information retrieval, Management planning, Programming (Computers), Optimization, Linear programming, Cybernetics, USSR.

AD-614 597 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
A HIGH TEMPERATURE X-RAY DIFFRACTOMETER SPECIMEN HOLDER.
Final rept.,
by Russell F. Dreikorn. 1 Apr 65, 81p
Rept. no. R400-65-198
Contract AF19 628 4001, Proj. 4608, Task 460805
AFCRL 64-118

Unclassified report

Descriptors: (*X-ray diffraction analysis, Instrumentation), (*Heaters, Design), Heat-resistant materials, Test equipment, Heating elements, Alignment, Power supplies, Bibliographies.

A high temperature furnace for use on a horizontal diffractometer was designed and constructed. It can heat samples to 2250C in vacuum or 1790C in air for sustained periods without restricting the normal operation of the diffractometer. Mechanical adjustments compensate for the unknown thermal expansion of the internal parts of the furnace and a rotating mechanism reduces the effect of grain growth and recrystallization by improving particle statistics in the X-ray beam. By simple adjustments the furnace can be used on the Picker, Rigaku-Denki, and Siemens diffractometers. A rather extensive 'state-of-the-art' bibliography is included. (Author)

AD-614 605 Div. 30, 2

Electrical Engineering Research Lab., Univ. of Illinois.
THE UNIVERSITY OF ILLINOIS RADIO TELESCOPE.
Progress rept. no. 23, 1 Jan-31 Mar 65,
by G. C. McVittie and G. W. Swenson, Jr.
28 Apr 65, 5p
Contract Nonr183422

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Radio astronomy, Telescopes), (*Telescopes, Radio astronomy), Universities, Illinois, Parabolic antennas, Maintenance, Electronics, Astronomical data.

A description of the maintenance of, the improvements in the electronics of, and the astronomical discoveries made with, the 600' x 400' parabolic cylinder radio telescope.

AD-614 630 Div. 30, 9, 15, 25
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
JOURNAL OF COMPUTER MATHEMATICS AND MATHEMATICAL PHYSICS, 1964, VOL. 4, NO. 2 (SELECTED ARTICLES).
15 Mar 65, 27p FTD-MT-64-458
TT 65-62078

Unclassified report

Edited machine trans. of Zhurnal Vychislitel'noi Matematiki i Matematicheskoi Fiziki (USSR) v4 n2 p306-16, 376-9 1964.

Descriptors: (*Gas flow, Blunt bodies), (*Supersonic flow, Shock waves), (*Linear programming, Iterative methods), Dissociation, Thermodynamics, Differential equations, USSR.

Contents: Analysis of flow around blunt bodies with detached shock wave by an equilibrium dissociating gas on a method of selection of input variable in simplex method of linear programming.

AD-614 634 Div. 30
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ASPECTS OF ASSOCIATIVE PROCESSING,
by J. A. Feldman. 21 Apr 65, 50p
Technical note TN-1965-13
Contract AF19 628 500
ESD TDR-65-65

Unclassified report

Descriptors: (*Data processing systems, Information retrieval), (*Information retrieval, Data processing systems), (*Computer storage devices, Information retrieval), Programming languages, Programming (Computers), Simulation, Digital computers, Language, Pattern recognition, Artificial intelligence, Word association, Memory.

Several aspects of information processing on a computer with an associative memory are discussed. The first section describes a source language for use with such an associative processor. An efficient way of simulating an associative processor on conventional computers is the topic of the second section. The conclusion contains a discussion of the underlying assumptions as well as several suggested applications. The applications to artificial intelligence and natural language processing indicate the greatest promise. (Author)

AD-614 638 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
BLACKBODY REFERENCE FOR TEMPERATURES ABOVE 1200 K: STUDY FOR DESIGN REQUIREMENTS,
by Albert F. Grenis and Michael J. Matkovich.
Jan 65, 25p Technical rept. no. AMRA-TR-65-02
Proj. 1C024401A110, Task 35232 Unclassified report

Descriptors: (*Temperature sensitive elements, Calibration), (*Blackbody radiation, Standards), Theory, High-temperature research, Radiation pyrometers, Infrared radiation, Instrumentation, Design, Vacuum apparatus, Thermal insulation, Materials, Graphite, Heating elements.

Studies were made in the design of a temperature reference unit, incorporating a vacuum system with a sighting window, for temperatures ranging from 1200 K to 2100 K. In view of the many variables present, the design study was supplemented with analytical and experimental data. Included in this work were transmittance studies of different sighting windows for blackbody radiation, the study of thermal shielding, and experimental studies of blackbody radiation. The window materials available included fused silica, calcium fluoride, and sodium chloride. Recommendations are made in regard to structural materials, sighting windows, and thermal shielding. (Author)

AD-614 643 Div. 30, 8, 25

Rabinow Electronics, Inc., Rockville, Md.
HIGH SPEED MESSAGE ENTRY EQUIPMENT.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 65,
by Alfred Breslauer and Prescott Palmer.
31 Mar 65, 25p
Contract DA28 043AMC00091E, Proj. 1G6 40303D481 12 01
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors:(*Reading machines, Optical scanning), (*Character recognition, Reading machines), (*Optical equipment, Reading machines), (*Communication theory, Reading machines), Computer logic, Input-output devices, Pattern recognition, Printing, Coding, Digital computers, Systems engineering.

The object of this research and development is to design and fabricate an advance development model of an equipment for reading typed messages and converting the information into electrical code form for communications applications.

AD-614 681 Div. 30, 19, 25
CFSTI Prices; HC$4.00 MF$1.00

Martin Co., Orlando, Fla.
CHARGED PARTICLE GRAVITOMETER RESEARCH.
Final rept. for 1 Jan-31 Dec 64,
by Robert A. Cunningham and John J. Stalder. Apr 65,
116p OR-6377
Contract AF19 628 3992, Projs. 8607, 7600,
Tasks 860703, 760007
AFCRL 65-103
Unclassified report

Descriptors: (*Meters, Gravity), (*Charged particles, Gravity), (*Gravity, Measurement), Instrumentation, Acceleration, Accelerometers, Errors, Stability, Spheres, Coatings, Damping, Numerical analysis, Differential equations, Inertial navigation.

Charged particle measurement to techniques have been investigated regarding their capabilities for absolute and relative gravity measurements. Force-balance particle techniques, particle pendulum approaches and free-particle methods have been evaluated analytically and experimentally in relation to gravity measurement requirements. Free-particle bouncing and recapture methods were determined to be the most appropriate with experiments demonstrating general performance feasibility. Additional development is required in order to achieve suitable free-particle instrumentation techniques. Research could then be conducted to evaluate and minimize error sources. It is concluded that free-particle relative gravity measurement capabilities should be evaluated before absolute gravity techniques are developed. (Author)

AD-614 691 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ON THE APPROXIMATE IDENTIFICATION OF PROCESS DYNAMICS IN COMPUTER CONTROLLED ADAPTIVE SYSTEMS,
by L. Braun, Jr., E. Mishkin, and J. G. Truxal.
16 Oct 59, 23p Rept. no. R-745-59, PIB-673
Contracts DA30 069ORD2646, DA30 069ORD1560
AROD 2268:2E
Unclassified report

Descriptors: (*Adaptive control systems, Computer logic), (*Computer logic, Adaptive control systems), Communication theory, Signals, Analog computers, Switching circuits, Special functions (Mathematical), Polynomials, Transformatious (Mathematics), Equations, Switching circuits.

Modern control systems are complex and must meet stringent performance requirements. There is an obvious need in such systems for development of design procedures for computer-controlled systems which make use of the highly developed computer art. This paper presents an attempt to apply computers in the solution of one class of such systems. The realization of the novel computer circuits required is outlined, and the overall design logic is presented. The designer versed in the art will have no difficulty integrating the individual circuits. It appears that analog circuits interconnected by means of switching devices will be useful in the realization of the required computing circuits. The required computer facility seems to be reasonable, and commensurate with the control problem. (Author)

AD-614 696 Div. 30, 23
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
COMPUTERS AND DECISION-MAKING IN EDUCATION.
A professional paper,
by John G. Caffrey. 16 Mar 65, 20p Rept. no. SP-2002
Unclassified report

Presented at the SDC/Univ. of Georgia Conference, Athens, Mar 29-31, 1965.

Descriptors: (*Computers, Decision making), (*Decision making, Computers), Programming (Computers), Education, Management engineering, Data processing systems, Automation, Probability.

Computers are tools to help man think. They do not, strictly speaking, ever make decisions. We make the decisions when we write the programs which specify what is to be done under each foreseeable circumstance. In so doing, our values are exposed--to our own view and to others. Some of the resistance to the use of computers in the management of human institutions may arise from anxiety about the computer imperative: The need to make explicit the bases upon which we intend to take actions and to select among alternatives. However, properly understood, this imperative may in the long run

not only require but permit more creative and flexible management and control systems in education, with the object of improving our capacity to predict consequences and to respond to rapidly changing circumstances. (Author)

AD-614 700 Div. 30, 22
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Lab., White Oak, Md.
U. S. NAVAL ORDNANCE LABORATORY UNCLASSIFIED REPORTS PUBLISHED BY THE AEROBALLISTICS AREA.
Final rept. for 1 Oct 45-31 Dec 62,
by Betty M. Thompson. 24 Nov 64, 96p
Rept. no. NOLTR-64-222
Proj. 600 0100

Unclassified report

Descriptors: (*Naval research, Reports), (*Reports, Naval research laboratories), Ballistics, Indexes, Abstracting, Bibliographies, Fluid mechanics, Ordnance.

A list of all Naval Ordnance Laboratory Unclassified reports published by the Aeroballistics Area during the period 1 October 1945 through 31 December 1962 is presented. (Author)

AD-614 704 Div. 30
CFSTI Prices: HC$4.00 MF$0.75

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
ADVANCED PROGRAMMING DEVELOPMENTS: A SURVEY.
Feb 65, 109p ESD TR-65-171

Unclassified report

Prepared in cooperation with Computer Associates, Inc., Wakefield, Mass.

Descriptors: (*Computers, Systems engineering), (*Programming (Computers), Reviews), Computer personnel, Computer operators, Data processing systems, Feasibility studies, Management engineering, Programming languages, Information retrieval.

The document constitutes a representative survey of twenty computer software systems which have been developed within the last decade. The surveyed systems are grouped into six major categories: (1) general purpose programming and executive systems; (2) functional systems; (3) man-machine interface systems; (4) special purpose programming systems; (5) time-sharing systems; (6) generalized data management systems. Each system discussed within these categories exhibits a particular feature or set of features which constitutes a distinct contribution to the effort to produce more general, more flexible and less job dependent systems which can be conveniently operated by a user. The survey notes that to date efforts to develop these features into integrated computer systems and sub-systems exist only on a small scale and in only a small number of laboratories scattered across the country. In view of the many potential applications of such integrated, generalized computer systems, especially in military environments, the survey concludes that the time is ripe for a technical program designed to demonstrate the feasibility of generalized computer systems and sub-systems in the solving of traditional data processing problems. (Author)

AD-614 734 Div. 30, 2, 8

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE HAYSTACK MICROWAVE RESEARCH FACILITY,
by H. G. Weiss. 1964, 21p Rept. no. JA2494
Contract AF19 628 500

Unclassified report

Pub. in IEEE Spectrum p50-69 Feb 1965
(Copies not available to DDC or Clearinghouse customers).
See also AD-614 734.

Descriptors: (*Microwaves, Test facilities), (*Microwave frequency, Laboratories), Space communication systems, Radar, Radar antennas, Radar tracking, Radio astronomy, Radio waves, Radomes, Antennas, Telescopes, Propagation, Scientific research.

Haystack is a multipurpose facility, designed to operate as a versatile ground terminal for satellite, space communication, and radio propagation experiments, as a powerful tracking and measurements radar, and as a sensitive, high-resolution radio telescope. In each of these applications, the Haystack system has a performance capability superior to that of any existing microwave facility.

AD-614 746 Div. 30, 8

Electronics Research Lab., Univ. of California, Berkeley.
A CENSUS OF FINITE AUTOMATA.
Extended summary,
by Michael A. Harrison. 1965, 4p
Grant AF AFOSR639 64
AFOSR 65-0631

Unclassified report

Pub. in Proceedings of the Annaul Symposium on Switching Circuit Theory and Logical Design(5th) Princeton Univ., Princeton, N. J., November 11-13, 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Automata, Combinatorial analysis), (*Combinatorial analysis, Automata), (*Switching circuits, Theory), Algebra, Computer logic.

Closed form expressions are obtained for enumerating the non-equivalent finite automata under several definitions of equivalence. Algorithms are presented for determining the number of connected automata and automata with a distinguished initial state. Useful lower bounds and asymptotic results are obtained. (Author)

AD-614 763 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AN ELECTROMECHANICAL MULTIPLYING INTEGRATING DEVICE,
by N. M. Rudnyi and L. A. Vereshchagin. 9 Apr 65,
5p FTD-TT-64-1083
TT 65-62083

Unclassified report

Unedited rough draft trans. of Russian patent 154096, appl. 775075/26-24, Apr 21 1962.

Descriptors: (*Integrators (Computers), Design), Electromechanical converters, Multiple operation, Integrals, Functions, Combinatorial analysis, Patents, USSR.

The Invention consists of an electromechanical multiplying and integrating device which is distinguished by the

fact that for the purpose of automation of the process of computing the integral function it is designed in the form of an immovable half ring on which there is fastened an induction output coil and two movable elements, one of which represents a toothed half disk rigidly connected with a permanent magnet, and the other is designed in the form of a revolving clamp with terminals which serve for closing an overall magnetic flux. (Author)

AD-614 766 Div. 30, 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
OPTICAL AND RADIO-FREQUENCY CHARACTERISTICS OF MULTIRAY INTERFEROMETER WITH DIFFRACTION MIRRORS ON THIN DIELECTRIC PLATES,
by F. A. Korolov and V. I. Gridnev. 7 Apr 65, 11p
FTD-TT-65-292
TT 65-62086
Unclassified report

Unedited rough draft trans. of Moscow Univ. Vestnik. Seriya 3: Fizika, Astronomiya (USSR) v18 n4 p14-7 1963.

Descriptors: (*Interferometers, Multiple operation), Optical properties, Radiofrequency, Metal films, Diffraction, Mirrows, Dielectric films, Optics, Millimeter waves, USSR.

A new type Fabry-Perot interferometer with metallic film diffraction mirrors mounted on thin dielectric plates has been developed. Measurement of the resolving power (figure of merit) of the interferometer was measured at wavelengths of 8 and 4 mm. Dependence of the resolving power on the ratio of the diameter of the reflectors to wavelength as well as on the transmission coefficient of the reflectors was demonstrated. Values of the transmission coefficient of the interferometer as a function of the transmission coefficient of the reflector were measured. (Author)

AD-614 777 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
LIQUID HELIUM LEVEL INDICATOR,
by Thaddeus X. Szwajer and Russell Homer.
Feb 65, 12p Technical rept. no. ECOM-2570
Proj. 1L0 13001A91A, Task 1L0 13001A91A23
Unclassified report

Descriptors: (*Liquid level gages, Liquefied gases), (*Helium, Liquefied gases), Voltage dividers, Storage tanks, Circuits, Avalanche diodes, Carbon resistors.

A device to detect the level of liquid helium in stainless steel Dewar is described. Various alternate methods of liquid helium detection are described, as well as the method selected to measure the varying resistance of carbon at low temperatures. A meter-expanding circuit, utilizing a Zener diode, is shown to be an aid in metering the change of resistance. The problems involved in Zener diode metering circuits, including linearity and current versus voltage characteristics, are examined experimentally. The results indicated that the basic circuit, with some modification, could be used in other applications of meter expansion. Operation of the final instrument is described showing the advantages of its simple design. The result of trade-off of optimum values is shown. The electrical characteristics of the Zener diode make it suitable for discriminating between two slightly different input voltage levels. (Author)

AD-614 778 Div. 30, 5, 20
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
A TAPE RECORDER NEGATIVE-TIME AND TRANSIENT TRIGGERING SYSTEM,
by Robert I. Rubinstein and Martin L. Long, Jr.
Oct 64, 24p Technical rept. no. ECOM-2519
Proj. 1P6 22001A055, Task 1P6 22001A 055 01
Unclassified report

Descriptors: (*Transients, Trigger circuits), (*Magnetic recording systems, Trigger circuits), (*Trigger circuits, Transients), Magnetic tape, Oscilloscopes, Display systems, Radiation effects, Photomultipliers, Electron tubes, Instrumentation.

A Negative-Time and Transient Triggering System (NETATT) has improved the systematic playback of transient phenomena stored on magnetic recording tape. A specific recorded trigger signal previously required to initiate the oscilloscope display of the recorded transient phenomena is no longer necessary. The NETATT System utilizes the passage of the transient phenomenon or any other simultaneously recorded transient signal across the recording head of the tape recorder as the trigger. Since the recording head in most tape recorders precedes the playback head, the system significantly increases the amount of pre-transient display available and permits the experimenter to locate the displayed transient on any preselected portion of the oscilloscope screen at varying sweep speeds without the loss of desirable information. The NETATT System provides many of the advantages of a tape searcher without incorporating its disadvantages. The NETATT System is capable of performing functions that are impossible to perform with a tape searcher. The specific transient radiation effects observed on a photomultiplier tube with the NETATT System are described. (Author)

AD-614 782 Div. 30
CFSTI Prices: HC$3.00 MF$0.50

RAND Corp., Santa Monica, Calif.
AN EXPERIMENTAL SYNTAX-DIRECTED DATA STRUCTURE LANGUAGE,
by Robert K. Lindsay, Terrence W. Pratt, and Kenneth M. Shavor. Apr 65, 51p Rept. no. P-3112
Unclassified report

Prepared in cooperation with Texas Univ., Austin. Grant NSF GU483.

Descriptors: (*Compilers, Programming languages), (*Programming languages, Compilers), Data storage systems, Artificial intelligence, Word association, Programming (Computers).

Programmers developing systems of the complexity required in artificial intelligence research are frequently hindered by the rigid programming languages available and the time-consuming task of implementing new languages. AMOS (for associative memory organizing system) provides a flexible means to structure data and experiment with the syntactic forms of program statements while lessening the implementation bottleneck. AMOS is a syntax-directed compiler used to define languages for constructing a variety of data organizations of which Fortran-like arrays and IPL-like list structues are special cases. This research explores the use of syntactic descriptions which are not Backus Normal Form grammars and provides means for defining two-demensional languages as well as the usual linear type. In order to facilitate implementation, the system may be conveniently imbedded in any monitor system of common design; AMOS operations are manipulations within high-speed storage only. (Author)

AD-614 783 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
'SORT BY EXCHANGE' ON LINKED LISTS,
by Donald Cohen and Gerald Levitt. Apr 65, 5p
Rept. no. P-3122
Unclassified report

Descriptors: (*Programming (Computers), Operation), Computers.

The sort-by-exchange method for a linked list consists of comparing consecutive links between items and then making a physical exchange if a link is out of place. After the last 2 links on the list have been compared, the process begins again at the head of the list, terminating only when no further exchanges are needed. This procedure applies for ordering relatively short lists (short enough to be contained in directly accessible memory) on which a few links are out of sequence.

AD-614 817 Div. 30, 2, 8, 10, 12, 25
CFSTI Prices: HC$3.00 MF$0.75

Aerospace Technology Div., Library of Congress, Washington, D. C.
FOREIGN SCIENCE BULLETIN, 1965, VOL. 1, NO. 5.
May 65, 72p Unclassified report
TT 65-62096
A Monthly Review of Selected Foreign Scientific and Technical Literature Sponsored by the Department of Defense.
See also AD-609 580.

Descriptors: (*Scientific research, Reviews), Periodicals, Government (Foreign), Waveguides, Pipes, Seismographs, Combustion, Lasers, Ferromagnet materials, Yttrium compounds, Rare earth compounds, Iron compounds, Garnet, Crystal growth, Orbital trajectories, Astronautics, Space medicine, Transducers, Symposia.

Contents: Gas mains as waveguides; New Soviet long-period seismographs; Intensification of combustion processes; Giant laser pulses with a photochemical shutter; Growing yttrium and rare earth element-iron garnet crystals; Many-impulse optimal plane transfers in a homogeneous central gravitational field; Voskhod-2--man in space and biotechnology; Science and technology notes.

AD-614 819 Div. 30, 9, 15
CFSTI Prices: HC$2.00 MF$0.50

Cincinnati Univ., Ohio.
PREDICTING EQUILIBRIUM PRESSURES FROM TRANSIENT PRESSURE DATA.
Interim technical rept. for Feb-Aug 64,
by David L. Brown. Jan 65, 45p
Contract AF33 616 8453, Proj. 7064
ARL 65-7
Unclassified report

Descriptors: (*Wind tunnels, Pressure), (*Pressure, Mathematical prediction), (*Least squares method, Mathematical prediction), (*Time-lag theory, Pressure), Mathematical models, Curve fitting, Wind tunnel models, Thermodynamics, Transducers.

It was the purpose of this study to investigate the time-lag phenomena associated with wind tunnel pressure measurements, and find a method for predicting the equilibrium pressure from the transient pressure conditions. In order to do this a mathematical model of the actual physical case was formulated. Actual transient pressure data was fitted by least squares to this model and the equilibrium pressure predicted. (Author)

AD-614 820 Div. 30, 23, 28, 32
CFSTI Prices: HC$1.00 MF$0.50

Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.
DEFINING TECHNICAL INFORMATION NEEDS FOR A RESEARCH LABORATORY,
by Helen Tomlinson. Mar 65, 19p PRL TR-65-4
Projs. 6755, 7717
Unclassified report

Descriptors: (*Personnel management, Air Force), (*Research program administration, Air Force), (*Air force research, Personnel management), (*Documentation, Research program administration), Job analysis, Air force personnel, Attention, Test construction (Psychology), Psychometrics, Scientific personnel, Libraries.

A checklist survey form listed 78 areas of probable or possible interest to members of a personnel research laboratory. Staff members responded to each item by marking one of 4 degrees of interest. A computer grouping technique was applied to cluster the 71 interest profiles in terms of common interests. 7 groups were identified and characterized by the major overlapping topics. The final cluster that included all staff members provided a listing of the topics in terms of overall laboratory concern. Results define the organization's technical information requirements and identify specialized consultants on acquisition and indexing problems. (Author)

AD-614 829 Div. 30, 2, 25
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
A BACKSCATTER NEPHELOMETER.
Final rept.,
by Donald J. Mary. 24 Feb 65, 27p
Rept. no. TM-65-11
Proj. 36100
Unclassified report

Descriptors: (*Optical instruments, Meteorological instruments), Fog, Light, Scattering, Atmosphere, Optics, Measurement, Spectrum analyzers, Design.

A device to measure the backscatter of optical radiation by fog is described. The integrated scattering coefficient can be measured over the range 178 < phi < 179.3 deg in the spectral region of 0.64 to 1.07 microns. Equations relating the integrated scattering coefficient and the system parameters are presented. (Author)

AD-614 831 Div. 30, 14, 25, 26
CFSTI Prices: HC$6.00 MF$0.25

LFE Electronics, Boston, Mass.
STUDY AND INVESTIGATION OF TECHNIQUE FOR CONSTRUCTING MEDIUM-SPEED RANDOM ACCESS MASS MEMORY.
Final rept. for 1 May-1 Nov 64,
by Harrison W. Fuller and Thomas L. McCormack.
Mar 65, 201p
Contract AF30 602 3422, Proj. 5581, Task 558108
RADC TR-64-538
Unclassified report

Descriptors: (*Computer storage devices, Manufacturing methods), Magnetic materials, Magnetic recording systems, Magnetic core storage, Thin films (Storage devices), Signal-to-noise ratio, Photographic recording systems, Plastics, Feasibility studies, Printed circuits.

This document reports on the feasibility of constructing medium speed random access mass memories using

batch fabrication techniques. The batch fabrication technique makes use of toroids etched out of sheet permalloy to batch fabricate the memory elements, and all drive and sense wiring is provided by a combination of precision etching and plating techniques. The resultant memory is inherently low power. System designs have been developed which use, for the most part, integrated circuitry. The resulting mass memory system of, say, 10 to the 8th power bits capacity is small (2 to 5 cubic feet), light (300 pounds), economical (less than one cent/bit), low power (less than 200 watts), medium speed (read-write cycle 25 to 35 microseconds), nonvolatile (magnetic), and also permits non-destructive readout. The major accomplishments have been the successful fabrication of planes having 16 x 16 bits on 25 mil centers with reasonable and steadily improving yield, initial success at fabricating 64 x 64 bit planes on 25 mil centers using mechanical pin registration, study of materials applicable to the memory, establishment of an economical manufacturing process, and experimental and theoretical investigations of S/N as it relates to such large scale memories. (Author)

AD-614 832 Div. 30, 8
CFSTI Prices: HC$3.00 MF$0.75

Controls for Radiation, Inc., Cambridge, Mass.
DEVELOPMENT OF RADIAC SET AN/TDQ-2 FOR DETECTION OF PULSED X-RADIATION FROM HIGH POWERED ELECTRONIC EQUIPMENT.
Final rept.,
by Richard C. McCall and Alfred C. Jasins. 30 Mar 65, 60p
Contract AF30 602 2791, Proj. 5587
RADC TDR-64-259
Unclassified report

Continuation of Contract AF30 602 1692.

Descriptors: (*Electronic equipment, X-rays), (*Monitors, X rays), (*X ray, Monitors), Electromagnetic pulses, Radar equipment, Scintillation counters, Safety, Portable.

A remote area monitor was developed for the purpose of detecting and measuring steady or pulsed x-radiation emission from high powered electronic equipment associated with radar installations. The system consists of six detectors connected to a central console by 250' cables. Each detector consists of a two foot square plastic scintillator coupled to a plastic light pipe which converges to a single photomultiplier, an internal calibration source and an amplifier. RF shielding is also provided. The central console utilizes six interchangeable modules with five decade logarithmic scales to indicate the radiation dose-rate from 1 milliroentgen/hour to 100 roentgen/hour. A push button switch is incorporated for each channel to check the calibration of the detector. In addition, an alarm system in the console provides both visual and audible signals when any one detector exceeds a pre-set radiation level. A fail-safe circuit was designed which indicates failure of detector operation by means of a bright light mounted on each module. The entire system was designed to operate on its own emergency power supply during power failure of up to 50 hours. (Author)

AD-614 840 Div. 30
CFSTI Prices: HC$5.00 MF$1.00

System Development Corp., Santa Monica, Calif.
THE TINT USERS' GUIDE,
by Phyllis R. Kennedy. 8 Mar 65, 151p
Technical memo. no. TM-1933/000/02
Contract SD97 Unclassified report

Descriptors: (*Programming (Computers), Instruction manuals), (*Compilers, Control sequences), (*Programming languages, Compilers), (*Teletype systems, Programming (Computers)), Data processing systems, Real time, Command and control systems, Digital computers.

A users' guide that instructs the prospective Time-Sharing user on how to use TINT, the On-line Teletype JOVIAL Interpreter. This guide present a brief introduction to the Time-Sharing System, a complete description of the TINT commands, a complete description of the dialect of the JOVIAL language which TINT interprets, and the TSS commands that are required when operating TINT. (Author)

AD-614 844 Div. 30, 2, 8
CFSTI Prices: HC$3.00 MF$0.75

University of Western Ontario, London. Dept. of Physics.
VAPOR ADSORPTION ON REFRACTOMETER SENSORS.
Annual rept. for Nov 63-Oct 64,
by Donald R. Hay, H. Edward Turner, and Chia-luan Ting. Nov 64, 99p Scientific rept. no. TP-1
Contract AF19 628 3835, Proj. 6682, Task 668202
AFCRL 64-968
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Refractometers, Humidity), (*Microwave equipment, Refractometers), (*Water vapor, Absorption), Ionospheric propagation, Atmospheric refraction, Probes (Electromagnetic), Surface properties, Quartz, Iron alloys, Nickel alloys, Moisture proofing, Coatings, Waxes, Condensation, Electric fields, Capacitors, Gravimetric analysis, Wind tunnels, Environmental testing, Canada.

An earlier study of refractometer response to a humid environment has indicated that the observed refractivity exceeds the true refractivity at relative humidities greater than 60 percent, at least for temperatures in the range 8 to 50 C. The present work defines more clearly the physical processes causing the refractivity error and assesses methods of reducing the error. The refractivity error for relative humidities exceeding 70 percent is greater when vapor is injected into the air as steam than when evaporated slowly from an open water surface. Quartz in the sensing element, whether in the region of strong electric field or in the fringe-field region, causes large errors at high relative humidities. The depth of the adsorbed layer is 3 microns on untreated invar and 1 micron on quartz at a relative humidity of 90 percent, as observed in the wind tunnel, but only about one-ninth of these when studied gravimetrically. An optical ellipsometer has shown the onset of microscopic condensation at relative humidities exceeding 70 percent on untreated invar; the size of the condensation droplets increases until they become visible at humidities approaching saturation.

AD-614 894 Div. 30, 32
CFSTI Prices: HC$1.00 MF$0.50

Air Force Office of Scientific Research, Washington, D. C.
AS LONG AS YOU'RE UP GET ME A GRANT; THE PREPARATION OF UNSOLICITED RESEARCH PROPOSALS,
by Harold Wooster. 1 Mar 65, 20p AFOSR 65-0392
Proj. 9769 Unclassified report

Descriptors: (*Scientific research, Costs), (*Research program administration, Costs), Documentation, Abstracting, Government procurement, Money.

The preparation of unsolicited research proposals is an art form peculiar to the R and D or Gilded Age. There are four stages in the search for research support: reconnaissance and target identification; contact; proposal writing and submission; and, patient waiting. Target identification is a sort of technical intelligence. A list of source documents for determining the research interests of potential fund sources is given; the search should not end until the lowest level in an agency who can say 'Yes' and make it stick is identified. Rules for bearding bureaucrats in their lairs during the contact, and ascertaining the oestrus cycle of the agency are followed, at long last, by suggestions for proposal preparation--title, abstract, detailed description of the work to be undertaken, and a cost estimate. Three of these are described as exercises in creative writing; the appendix gives specific recommendations for the preparation of cost estimates for grants and contracts. (Author)

AD-614 901 Div. 30, 26
CFSTI Prices: HC$1.00 MF$0.50

Institute of Optics, Univ. of Rochester, N. Y.
OPTICAL LENS SYSTEMS DESIGN FORMULAE FOR HIGH SPEED COMPUTERS,
Quarterly status rept. no. 3,
by Robert E. Hopkins. 31 Dec 64, 13p
Contract DA30 069AMC534A
Unclassified report

Descriptors: (*Lenses, Design), (*Optics industry, Data processing systems), (*Data processing systems, Optics industry), (*Programming (Computers), Optics industry), Optical materials, Machining, Computers.

The following areas of work are to be covered: (1) Improve and extend the optical design features in ORDEALS; (2) study the effects of glass choice, with particular emphasis on secondary color; (3) study three and four element objectives in order to pin point regions of solution; and (4) refine a program which makes drawings of optical components as viewed from any desired vantage point.

AD-614 922 Div. 30, 8
CFSTI Prices: HC$1.00 MF$0.50

Lear Siegler, Inc., Grand Rapids, Mich. Instrument Div.
DEVELOPMENT OF EXPERIMENTAL GAS DISCHARGE DISPLAY,
Quarterly progress rept. no. 6, 24 Dec 64-24 Mar 65. Apr 65, 11p Rept. no. GRR-65-1049
Contract NObsr89201, Proj. SR0080301, Task 9498
Unclassified report

See also AD-609 061.

Descriptors: (*Gas discharges, Display systems), (*Discharge tubes, Display systems), (*Display systems, Discharge tubes), Panels (Structural), Storage tubes, Photoelectric materials, Electric trigger controls, Circuits, Feasibility studies.

AD-614 949 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THERMAL PROBES FOR MEASURING THE DENSITY OF HEAT FLOWS,
by V. M. Kiselev. 12 Apr 65, 5p FTD-TT-64-1115
TT 65-62138 Unclassified report

Unedited rough draft trans. of Russian patent 153690, appl. 785189/26-10, Jul 4 1962.

Descriptors: (*Heat, Measurement), (*Thermocouples, Design), (*Temperature sensitive elements, Design), Thermal radiation, Blackbody radiation, USSR, Patents, Density.

The object of the invention is a thermal probe for measuring the density of heat fluxes which contains a heat receptive surface and a sensitive element with thermocouples. The sensitive element is designed in the form of a ring with the circuit of thermocouples wound on it. For the purpose of measuring the degree of blackness of a radiating surface the heat-receptive surface is designed in the form of a hollow chamber. A limiter of the angle of vision is provided for changing the amount of the radiating surface.

AD-614 951 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ALGORITHM OF THE SYNTHESIS OF LOGIC CONVERSIONS, OPTIMUM WITHIN A GIVEN SET,
by E. A. Yakubaitis. 13 Apr 65, 18p
FTD-TT-64-1143
TT 65-62140
Unclassified report

Unedited rough draft trans. of Akademiya Nauk Latviiskoi SSR, Riga. Institut Elektroniki i Vychislitel'noi Tekhniki. Trudy v4 p21-33 1963.

Descriptors: (*Input-output devices, Computer logic), (*Computer logic, Input-output devices), Synthesis, Optimization, Switching circuits, Mathematical logic, USSR.

A procedure is discussed for the synthesis of logic elements with several input signals and one output one. The proposed method is convenient in the use of discrete computing machines. (Author)

AD-614 958 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A METHOD OF MEASURING THE FLOW RATE OF LIQUIDS AND GASES AND A DEVICE FOR EXPLOITING THE METHOD,
by A. Sh. Kiyasbeili, M. E. Perel'shtein, and R. E. Aramyan. 13 Apr 65, 6p FTD-TT-64-1193
TT 65-62147
Unclassified report

Unedited rough draft trans. of Russian patent 161520, appl. 825278/26-10, Mar 15 1963.

Descriptors: (*Flowmeters, Acoustic equipment), Liquids, Gas flow, Pressure, Computers, Signals, Electric currents, Patents, USSR.

The proposed method offers the possibility of measuring the weight consumption of a liquid or gas by means of measuring with a computing device the ratio of the drop in the pressure occurring on the pickup of an acoustic flowmeter and converted into an electric signal, to an electric signal from the acoustic flow meter. The flow converter of the pressure is connected in parallel to the acoustic flow meter; the measuring element of the flow converter is connected to one input of the computing device the other input of which is connected with the converter of the acoustic flow meter.

AD-614 964 Div. 30, 26
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTROINDUCTIVE INSTRUMENT FOR CHECKING DIMENSIONS AND DETECTING FLAWS IN METAL PRODUCTS,
by A. T. Nikolaenko and N. L. Bondarenko.
19 Apr 65, 6p FTD-TT-64-1282
TT 65-62153
Unclassified report

Unedited rough draft trans. of Russian patent 155291, appl. 784245/25-8, Jul 26 1962.

Descriptors: (*Test equipment, Non-destructive testing), (*Metals, Non-destruction testing), USSR, Patents, Errors, Thickness, Electric currents, Oscillation, Meters, Coils, Winding, Electric wire, Electric bridges, Temperature.

The object of the invention is an electroinductive instrument for checking dimensions and detecting flaws in metal products based on the method of excitation and recording in a controllable area of eddy currents, which contains an inductive pickup, a comparison pickup, a generator of electrical oscillations, an amplifier, an indicator, and electrical elements of regulation. To reduce the temperature error of the measuring pickup and to increase the precision of checking, the coil of the pickup is provided with an additional winding wound with double wire which is soldered at one end. The free ends of the wire are included in the circuit of the automatic compensator on the axis of the motor of which there are mounted slides of the elements of the temperature compensation of the measuring bridge.

AD-614 967 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
GREATER BOUNDARIES OF SOVIET SCIENCE,
by V. Kirillin. 14 Apr 65, 9p FTD-TT-64-1327
TT 65-62156
Unclassified report

Unedited rough draft trans. from Izvestiya (USSR) p3 Nov 6 1964.

Descriptors: (*Scientific research, USSR), Physics, Chemistry, Solid state physics, Nuclear physics, Plasma physics, Computers, Mathematics, Materials.

A popularized article on scientific developments and plans for the future in the USSR is presented.

AD-614 968 Div. 30, 26, 32
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SCIENCE AND COMPETITION OF TWO SYSTEMS CYBERNETICS, NEW STAGE,
by N. Kirilyuk and L. Pil'kevich. 14 Apr 65, 9p
FTD-TT-64-1357
TT 65-62157
Unclassified report

Unedited rough draft trans. from Pravda Ukrainy (USSR) p3 Sep 12 1964.

Descriptors: (*Cybernetics, Industrial production), (*Economics, Cybernetics), Computers, Automation, Control systems, Theory, USSR.

A brief discussion on the employment of computer technology in the planning and controlling of a national economy.

AD-614 988 Div. 30, 28
CFSTI Prices: HC$2.00 MF$0.50

Duke Univ., Durham, N. C.
FROM BRIGHT IDEAS TO SOCIAL RESEARCH: THE STUDIES OF THE KENNEDY ASSASSINATION,
by Kurt W. Back and Judith Saravay. May 65,
32p Technical rept. no. TR-17
Contract Nonr-118111, Proj. NR177 470
Unclassified report

Descriptors: (*Scientific personnel, Social sciences), (*Decision making, Scientific personnel), (*Social sciences, Scientific personnel), Scientific research, Motivation, Test construction (Psychology), Psychology, Sociology.

The study of crisis research can give information on two issues in the methodology of social science: the decision to translate a research idea into actual practice, and the nature of the background of the research which preserves the ephemeral data of historical events. The study was done with the social scientists who conducted research on the assassination of President Kennedy and a matched control sample of other social scientists. The positions and interests of the critical and control groups differed little. In fact, a majority of the control group was interested in crisis research and even had thought about doing a study of the Kennedy assassination. Organizational pressures seemed little effective as a reason for doing research. Descriptions by the critical group of how they engaged in their study showed a strong connection to current research and a quick start of the actual research process. The principal factor which seems to account for the action taken by the critical group is the evaluation taken of the role of the scientist. The control group is less interested in personal prestige and more in communication. Further the critical group was more inclined to take risks. This showed itself in the attitude toward research techniques, toward basic research as a risk-taking enterprise and in gambling on financial support for their studies. (Author)

AD-614 992 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
JOSS: EXAMPLES OF THE USE OF AN EXPERIMENTAL ON-LINE COMPUTING SERVICE,
by J. C. Shaw. Apr 65, 11p Rept. no. P-3131
Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only. Presented at the Sixth Annual Symposium of the Professional Group on Human Factors in Electronics, The Institute of Electrical and Electronic Engineers, Boston, May 6-8, 1965.

Descriptors: (*Special purpose computers, Numerical methods and procedures), (*Numerical methods and procedures, Special purpose computers), (*Data processing systems, Special purpose computers), Numbers, Numerical analysis, Programming (Computers), Programming languages, Input-output devices.

Contents (Since JOSS ignores input lines beginning with an asterisk, the device is used to interpose comments in the examples; on the original copy, output is in black and input in green):
Elements of the language
Stored program for computing the hypotenuse
Integration of 1/x by Gauss 2-point rule
Root finding
Matrix inversion with simple pivoting on the diagonal
An asterisk at the end can kill the line
Production of a formatted table.

AD-615 000 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

Army Electronics Labs., Fort Monmouth, N. J.
PUBLICATIONS, PRESENTATIONS AND PATENTS, 1964.
Bibliography.
1964, 61p
Unclassified report

Descriptors: (*Army research, Reports), (*Electronics, Reports), Electronics laboratories, Bibliographies, Lasers, Electronic equipment, Patents.

This report is a compilation of unclassified publications, presentations and patents made during the calendar year 1964 to consolidate some of the technical contributions made by USAEL personnel. It includes for the first time internally generated unclassified technical reports. USAEL sponsored symposia are also listed. Publications from contractually supported research programs are not included.

AD-615 018 Div. 30, 8
CFSTI Prices: HC$1.00 MF$0.50

Navy Electronics Lab., San Diego, Calif.
A HIGH-SPEED INFRARED MAPPING SYSTEM FOR RELIABILITY ASSESSMENT OF MINIATURE ELECTRONIC CIRCUITS.
Rept. for Jun 64-Jan 65,
by H. F. Dean and R. M. Fraser. 15 Mar 65, 23p
Rept. no. NEL-1272
Proj. SF013 14 04, Tasks 5786, NEL R11051
Unclassified report

Descriptors: (*Microminiaturization (Electronics), Reliability (Electronics)), (*Integrated circuits, Reliability (Electronics)), (*Infrared images, Nondestructive testing), Miniature electronic equipment, Test methods, Circuits, Infrared equipment, Infrared scanning, Infrared radiation.

Describes current progress at NEL in development of a high-speed infrared mapping system for reliability assessment of miniature electronic circuits. Surface area of circuit tested is scanned. Output of indium antimonide IR detector is recorded. Black and white IR energy maps are produced by direct writing. Small temperature differences from surface areas small as 0.001 in. sq can be read back by densitometer techniques. Temperature recording range and bandwidth are adjustable. Present equipment makes a 600-line map of a 1-in.-sq surface area in a 30-minute period at environmental temperature low as 60C. Further developments will provide higher resolution at slightly lower environmental temperatures. (Author)

AD-615 030 Div. 30
CFSTI Prices: HC$1.25 MF$0.50

Watervliet Arsenal, N. Y.
THE EFFECTS OF HIGH PRESSURE ON FOIL STRAIN GAGES ON CONVEX AND CONCAVE SURFACES.
Final technical rept.,
by R. Vincent Milligan. Mar 65, 41p
Rept. no. WVT-6512
Proj. 1A0 13001A039 26
Unclassified report

See also AD-611 211.

Descriptors: (*Strain gages, High-pressure research), (*High-pressure research, Strain gages), (*Foils, Strain gages), Pressure vessels, Stresses, Mathematical analysis, Hydrostatic pressure, Steel, Aluminum, Magnesium, Surfaces, Strain (Mechanics), Compressive properties, Curved profiles.

The investigation was made to determine whether a linear pressure-strain response could be obtained for gages mounted on convex and concave specimens subjected to hydrostatic pressures to 140 ksi. Linear pressure-strain curves were obtained for five different types of foil strain gage having gage lengths varying from 1/16 to 1/4 in. These were mounted on steel, aluminum and magnesium specimens having diameters ranging 1/4 in. convex to 3/8 in. concave. The inverse slope of the pressure-strain curves was compared with the compressibility constant to determine a percent deviation. The percent deviation was found to be essentially independent of gage length for the range of specimen configurations investigated except where the radius of curvature of the specimen induces problems in mounting the gages. Since a linear pressure-strain response was obtained, it is possible to correct the strain readings for gages mounted on specimens of varied hydrostatic compressibility and geometrical configuration.

AD-615 062 Div. 30, 20

National Research Council of Canada, Ottawa (Ontario). Div. of Applied Physics.
AN IMPROVED SUMMING COMPTON GAMMA-RAY SPECTROMETER,
by J. H. Aitken. 11 May 64, 7p NRC-8115
Unclassified report

Pub. in Nuclear Instruments and Methods v30 p116-22 1964 (Copies available only to DDC users).

Descriptors: (*Nuclear radiation spectrometers, Gamma-ray scattering), (*Gamma-ray scattering, Nuclear radiation spectrometers), Compton scattering, Scintillation counters, Analog computers, Gamma-ray spectra, Semiconductor devices, Crystal detectors, Photons, Line spectrum, Design.

A simple ad hoc analog computer using semiconductor logarithmic elements is used to examine the coincident pulse-pairs from a summing Compton spectrometer for compatibility with the Compton scattering equation for the particular scattering angle being used. With the aid of this circuit, the total absorption fraction of the spectrometer can be raised almost to 100% by identifying and rejecting electronically those coincidences in which some of the energy of the incident photon has escaped from either detector. At the same time, the polarization sensitivity of the Compton spectrometer is also improved since coincidences in which multiple scattering has taken place are rejected. The system can also be used to make the spectrometer telescopic, selecting electronically rather than by heavy collimators the incident direction of interest. The latter capability may be useful in situations where there is an omnidirectional flux. Though scintillation crystals have been used here to demonstrate the principle, the technique would be equally applicable (and perhaps most useful) in a light and compact Compton spectrometer using semiconductor detectors. (Author)

AD-615 069 Div. 30, 20

Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
TEMPERATURE REGULATOR FOR A 9 LITER LIQUID HYDROGEN BUBBLE CHAMBER,
by A. Barna. 8 Jul 63, 10p
Unclassified report

Pub. in Nuclear Instruments and Methods v26 n1 p109-116 1964 (Copies available only to DDC users).

Descriptors: (*Bubble chambers, Temperature control), (*Temperature control, Liquefied gases), Control systems, Design, Manufacturing methods, Wiring diagrams, Radiation measurement systems, Hydrogen.

A temperature regulator servo system with a long term stability of better than 0.010 °K at 28.5 °K is described. Design considerations, components, and construction techniques are discussed. (Author)

AD-615 072 Div. 30, 17

Technion - Israel Inst. of Tech., Haifa.
THE EFFECT OF FREQUENCY ON THE ELECTRICAL RESISTIVITY OF GRANULAR METAL FILMS,
by A. A. Hirsch, N. Friedman, and S. Bazian.
12 Oct 64, 3p
Grant AF EOAR63 71
AFOSR 65 0748
Unclassified report

Pub. in Vacuum v14 p393-4 1964 (Copies available only to DDC users).

Descriptors: (*Metal films, Resistance (Electrical)), (*Test methods, Metal films), Thickness, Measurement, Electrical impedance, Frequency, Vacuum, Evaporation.

A resistance method is given for the determination of the thickness of thin granular metal films based on the use of impedance measurements at frequencies in the order of magnitude of 1 Mc/sec. At these frequencies the intergranular gap resistance can be seen as short circuited by the inter-granular capacitance, so that the measured resistance is that of the metal grains. As shown the resistivity of the individual grains is in general several times greater than the bulk resistivity of the metal. This difference depends strongly on the vacuum conditions and the rates of evaporation. (Author)

AD-615 081 Div. 30, 9
CFSTI Prices: HC$4.00 MF$1.00

Naval Ordnance Lab., White Oak, Md.
THE CONSTANT ACCELERATION GAS GUN PROBLEM,
by Ernst H. Winkler. 15 Aug 64, 123p
Ballistics Research rept. no. BRR-133, NOLTR 64-133
Unclassified report

Descriptors: (*Light gas guns, Acceleration), (*Hypervelocity guns, Acceleration), Hypervelocity projectiles, Propellants, Fluid flow, Compressors, Differential equations, Integrals.

An analytical study of the constant acceleration gas gun problem was made. It is shown that a necessary and sufficient condition exists which the propellant flow in the gun barrel must fulfill in order to maintain a constant pressure at the base of the projectile. The particular flow phenomenon which fulfills the required condition is characterized by the absence of any relative variation of flow velocity. The whole flow then is in a state of constant acceleration. The governing equation of this constant acceleration flow and the gradients which exist in it are derived. The conditions which must be produced in the gun chamber to generate a constant acceleration flow have been evaluated and the limitations imposed on its production are determined. A comparison is made of the pressure-time relation obtained from a free piston compressor and the required p-t relation to produce a constant acceleration flow. Various modifications of the pump chamber of a two-stage gun are investigated in order to determine the most suitable modification by which a constant acceleration gun can be realized. (Author)

AD-615 085 Div. 30, 15
CFSTI Prices: HC$1.00 MF$0.50

Michigan Univ., Ann Arbor. Coll. of Literature, Science, and the Arts.
DECISION PROBLEMS FOR MULTIPLE SUCCESSOR ARITHMETICS,
Technical rept.,
by J. W. Thatcher. Apr 65, 25p
Rept. no. 03105-36-T
Contract Nonr122421; Grant DA ARO D31 124G588, Projs. NR049 114, 4049M
Unclassified report

Prepared in cooperation with IBM Watson Research Center, Yorktown Heights, N. Y., Contract AF30 602 3340.

Descriptors: (*Decision theory, Automata), (*Mathematical logic, Automata), (*Automata, Design), Metamathematics, Recursive functions.

Let N sub k denote the set of words over the alphabet S sub k = (1, ..., k). N sub k contains the null word which is denoted. Decision problems are considered for various first-order interpreted predicate languages in which the variables range over N sub k (k > 2). The main result is that there is no decision procedure for truth in the interpreted language which has the subword relation as its only non-logical primitive. This, together with known results summarized in the report, settles the decision problem for any language constructed on the basis of a large number of relations and functions. (Author)

AD-615 100 Div. 30
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., Syracuse, N. Y. Electronics Lab.
MATRIX CONTROLLED DISPLAY DEVICE, PHASE II.
Interim engineering rept. no. 1, 11 Jan-5 Apr 65.
26 Apr 65, 39p
Contract Nobsr89334, Proj. SR080301, Task 9475
Unclassified report

Descriptors: (*Display systems, Optical equipment), (*Information retrieval, Display systems), Recording systems, Thermoplastics, Prisms (Optics), Deformation, Glass, Optical coatings, Indium compounds, Oxides, Electrodes, Copper, Plating, Feasibility studies.

The progress in a program to develop a feasibility model of a bright, large screen matrix type display using in-air thermoplastic recording and TIRP (Total Internal Reflection Prism) projection techniques is reported. A brief summary of the Phase I program is given prior to discussing the current Phase II effort. The test setup to provide a 25 x 25 elemental portion of the large screen display by optical readout of deformations on a thermoplastic medium is described. Control of the in-air recording process by an X-Y matrix to provide individual storage of information is discussed. Techniques to be employed for fabricating a 25 line matrix with electrodes at 500 line pairs per inch are listed. The results are

given for the several fabrication processes which have either been completed or have commenced. These include the preparation of artwork and a photographic mask, exposure of a photosensitive resist to form the reverse image of the matrix electrodes prior to etching, and the coating of glass plates to be used for matrix substrates with a transparent conductive film of indium oxide. Initial experiments with electroless copper plating were performed and are described. The fabrication of a 2000 line matrix, which is to be initiated during this contract, is discussed. (Author)

AD-615 117 Div. 30, 26
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
RESEARCH IN THE MANAGEMENT OF COMPUTER PROGRAMMING,
by George F. Weinwurm. 1 May 65, 14p
Rept. no. SP-2059
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Systems engineering), (*Systems engineering, Programming (Computers)), Data processing systems, Computers, Management engineering, Costs, Automation.

Computer programming is a relatively new and rapidly growing segment of Automatic Data Processing and is an area largely unexplored from the standpoint of management science. The management measures and standards that are common to many, more mature industries are nearly non-existent in computer programming. The Paper describes the work that has been underway at the System Development Corporation for almost three years directed toward the advancement of the state-of-the-art of computer programming management. (Author)

AD-615 149 Div. 30, 9, 15
CFSTI Prices: HC$1.00 MF$0.50

Gas Dynamics Lab., Princeton Univ., N. J.
ON A NEW ULTRA-HIGH VACUUM PUMP,
by Yau Wu. Dec 64, 16p Rept. no. 715
Contract AF49 638 1271; Grant NSF GK59
AFOSR 65-0194 Unclassified report

Descriptors: (*Vacuum pumps, Hydrodynamics), Compressor, Cascade structures, Density, Gases, Heat transfer, Matrix algebra, Probability, Vacuum.

The theory of highly rarefied cascade flow was presented and a proposal for a new axial-flow (or radial flow) pump (or compressor) in the free-molecule range was made. An unconventional cascade was suggested which will produce an extremely high compression ratio (up to 30,000) in a single stage at very high blade speed (S = V sub b/square root (2 RT) = 20). This new pump (or compressor) can be used to reach any ultra-high vacuum state, i.e. and 'almost empty state'. (Author)

AD-615 182 Div. 30, 8, 26

California Univ., Los Angeles. Dept. of Engineering.
A SUBOPTIMAL ON-LINE DISCRETE CONTROLLER WITH BOUNDED CONTROL VARIABLES,
by F. H. Kishi. 29 Oct 62, 7p
Contract AF33 657 7154; Grant AF AFOSR62 68
AFOSR 65-0619
Unclassified report

Pub. in Applications and Industry p1-7 Jul 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Control systems, Synthesis), Signal generators, Simulation, Digital systems, Optimization, Matrix algebra, Iterative methods.

A method to synthesize the control signal on-line, by using the form of an optimization problem, is examined. Control of linear processes is considered, and bounds or inequality constraints on the control variable are attacked directly, without assigning penalties on the performance criterion. The optimal-control problem is formulated as a nonlinear programming problem, and the solution is obtained through a co-ordinate-wise gradient method. Simulation of the on-line controller is performed; a marked improvement in accuracy over conventional sampled data systems is shown. The method, as presently employed, can consider bounds on the magnitude or on the rate of change of the control variable. (Author)

31. Ships and Marine Equipment

AD-614 565 Div. 31
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
RESISTANCE AND PROPULSION CHARACTERISTICS OF A ROUND-BOTTOM BOAT (PARENT FORM OF TMB SERIES 63).
Research and development rept.,
by Donald L. Blount. Mar 65, 33p Rept. no. 2000
Proj. S F014 02 02, Task 2062

Unclassified report

Descriptors: (*Boats, Propulsion), Ship hulls, Ship models, Propellers (Marine), Model tests, Graphics, Design, Drag.

The report gives the resistance and propulsion characteristics of the TMB Series 63 parent form. The data cover the effects of displacement, initial trim, and appendages. An example of the procedure to be followed in making a horsepower estimate using these data is included. (Author)

AD-614 632 Div. 31, 14, 17
CFSTI Prices: HC$3.00 MF$0.75

David Taylor Model Basin, Washington, D. C.
POTENTIAL HULL STRUCTURES FOR RESCUE AND SEARCH VEHICLES OF THE DEEP-SUBMERGENCE SYSTEMS PROJECT.
Rept. for Nov 64-Feb 65,
by Martin A. Krenzke, Kenneth Hom, and John L. Proffitt. Mar 65, 60p Rept. no. 1985
Proj. 5 0003

Unclassified report

Descriptors: (*Materials, Submarine hulls), (*Submarine hulls, Sea rescue equipment), Pressure vessels, Rescues, Configuration, Design, Spheres, Cylindrical bodies, Stiffened cylinders, Reinforcing materials, Ceramic materials, Oceanographic vessels, Steel, Titanium alloys, Aluminum alloys, Plastics, Glass, Buoyancy, Design.

Tradeoff studies between pressure hull material, configuration, and buoyancy are performed for both the Rescue and the Search Vehicles of the Deep-Submergence Systems Project. Spherical, cylindrical, and spheroidal shells of high strength steels, titanium alloys, aluminum alloys, glass-reinforced plastics, glass, and ceramics are considered. Failure criteria are developed based on recent research findings. Potential pressure hulls for both vehicles are discussed and the need to develop lightweight floatation systems for the Search Vehicle is emphasized. (Author)

AD-614 905 Div. 31
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
MODEL TESTS ON A BULK OIL CARRIER WITH TWIN-NACELLE STERN,
by Karl E. Schoenherr. Mar 65, 29p Rept. no. 1736

Unclassified report

Descriptors: (*Tankers, Model tests), Design, Ship hulls, Propellers (Marine), Performance (Engineering), Maneuverability, Ship models, Configuration, Propulsion, Power, Velocity, Vibration, Wake.

The report describes tests on a model of a supertanker fitted, consecutively, with a conventional twin-screw stern and a twin-nacelle stern. The results show that the latter design is superior to a conventional design with respect to power requirement and course-keeping ability and produces an acceptably regular wake in way of the propeller disk. Inasmuch as propeller-induced vibrations are becoming increasingly troublesome as speed and power of ships increase, the twin-nacelle stern arrangement would seem to be an excellent arrangement for high-powered, high-block-coefficient vessels. (Author)

AD-614 920 Div. 31, 14
CFSTI Prices: HC$1.00 MF$0.50

Woods Hole Oceanographic Institution, Mass.
SOME CHARACTERISTICS OF FISHBITE DAMAGE ON DEEP-SEA MOORING LINES,
by Harry J. Turner, Jr. and Bryce Prindle.
Apr 65, 19p Ref-65-22
Contract Nonr415500

Unclassified report

Descriptors: (*Mooring, Oceanographic equipment), (*Cordage, Anchors (Marine)), (*Anchors (Marine), Cordage), (*Electric cables, Underwater equipment), Cables (Mechanical), Fibers (Synthetic), Organic coatings, Polyvinyl chloride, Polyethylene plastics, Damage, Fishes, Caribbean Sea.

Mooring lines and electrical conductors for deep-sea installations in the vicinity of Bermuda may be attacked by some organism, presumably a fish, down to a depth as great as 1550 meters. Dental impressions on ropes sheathed with polyvinyl chloride and on polyethylene coated wire indicate that the causative organism probably has teeth in either the upper jaw or lower jaw but not both. The width of the jaw ranges from 30 mm to slightly over 100 mm and usually more than one tooth in each side of the jaw is involved. Tooth fragments recovered from a damaged polyethylene coated wire have a row of fine rounded serrations along the cutting edge (Author)

AD-615 021 Div. 31, 25
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
PLASTIC ANALYSIS OF CIRCULAR BULKHEAD STIFFENING SYSTEMS,
by Peter M. Palermo and Robert Bart. Mar 65,
31p Rept. no. 1946
Proj. S F013 03 02

Unclassified report

See also PB-156 421.

Descriptors: (*Bulkheads, Submarines), (*Plasticity, Bulkheads), Girders, Elasticity, Stresses, Marine engineering, Design.

A method of plastic analysis of the stiffening system for a flat circular bulkhead is presented. The analysis presented when used for design, permits utilization of the full ductility of the material without recourse to empirical factors. The results of the analysis are compared with experimental test results from seven full-scale submarine holding bulkheads. A sample design is included. (Author)

AD-615 080 Div. 31
CFSTI Prices: HC$1.00 MF$0.50

David Taylor Model Basin, Washington, D. C.

RESISTANCE AND PROPULSION CHARACTERISTICS FOR LVTP-X-7 AS REPRESENTED BY MODEL 4498-3, by A. L. Beal. Apr 59, 19p Rept. no. 1253
Unclassified report

Descriptors: (*Landing craft, Model tests), (*Drag, Landing craft), (*Marine propulsion, Landing craft), Ship models, Surface propulsion, Shrouded propellers, Hydrodynamic configurations, Fluid dynamic properties, Amphibious vehicles, Photographic analysis, Graphics.

Model tests were conducted to determine resistance and propulsion characteristics for the landing vehicle LVTP-X-7. This report gives results of attempts to attain satisfactory performance of the vehicle at desired speeds through the use of a bow vane, and to determine the power requirements for the vehicle with bow vane and Kort nozzles installed. (Author)

32. Miscellaneous Arts and Sciences

AD-614 603 Div. 32, 28
CFSTI Prices: HC$1.00 MF$0.50

Wisconsin Univ., Madison.
STUDY OF THE INFLUENCE OF CERTAIN CULTURAL AND CONTENT VARIABLES ON THE EFFECTIVENESS OF PERSUASIVE COMMUNICATIONS IN THE INTERNATIONAL FIELD.
Quarterly status rept.,
by S. Watson Dunn. 1 Apr 65, 3p
Contract Nonr120224, Proj. NR177 287
Unclassified report

See also AD-609 370.

Descriptors: (*Social communication, Culture), (*Culture, Social communication), (*Social psychology, Social communication), Sociology, Attitudes, Public opinion, Egypt, France.

AD-614 744 Div. 32, 16, 30

Western Reserve Univ., Cleveland, Ohio.
GENERALIZATION OF EPIDEMIC THEORY. AN APPLICATION TO THE TRANSMISSION OF IDEAS,
by William Goffman and Vaun A. Newill. 1964, 10p
Grants AF AFOSR403 64, PHS AM06399 03
AFOSR 65-0588
Unclassified report

Pub. in Nature v204 n4955 p225-8 Oct 17 1964
(Copies available only to DDC users).

Descriptors: (*Information retrieval, Theory), (*Epidemiology, Models (Simulations)), Mathematical models, Stochastic processes, Differential equations, Set theory.

One of the most fundamental problems in the field of information retrieval is that of determining the circumstances under which it might be necessary to introduce an information retrieval system as an aid to a given population of scientists. It is proposed that this problem be examined in terms of the transmission and development of ideas within a population. Specifically, the transmission of ideas within a population will be treated as if it were the transmission of an infectious disease, that is, in terms of an epidemic process. An attempt is made to indicate the role of information retrieval in the development of such a process. (Author)

AD-614 794 Div. 32, 30
CFSTI Prices: HC$2.00 MF$0.50

Duke Univ., Durham, N. C.
THE DUKE ALGOL COMPILER AND SYNTACTIC ROUTINE METHOD FOR SYNTAX RECOGNITION.
Final technical rept.,
by Thomas M. Gallie, Jr. 5 Apr 65, 34p
Grant AF AFOSR62 164
AFOSR 65-0715
Unclassified report

Descriptors: (*Compilers, Programming languages), (*Programming languages, Compilers), (*Machine translation, Programming languages), Data processing systems, Digital computers, Programming (Computers), Languages, Pattern recognition, Decision theory.

The development of the most important ideas about recognition and analysis of syntax within mechanical languages is discussed.

AD-614 796 Div. 32, 4, 7, 8, 22, 25
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., Corona, Calif.
ABSTRACTS OF U. S. PATENTS OBTAINED BY THE NOLC OFFICE OF PATENT COUNSEL 1957-1964,
by J. M. St.Amand. 1 Mar 65, 31p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Patents, Abstracting), (*Abstracting, Patents), Mechanical engineering, Chemistry, Electrical engineering, Ordnance, Electronics.

Each week the Official Gazette of the United States Patent Office prints abstracts from a thousand or so new technical disclosures that have been granted patents. Excerpted from issues of the Official Gazette and reprinted herein are those abstracts that pertain to patents obtained through the efforts of the Office of Patent Counsel of the Naval Ordnance Laboratory, Corona, California, from 1957 through 1964. The document was prepared with a view to making the unclassified technology described readily available to all Government personnel. (Author)

AD-614 816 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

Battelle Memorial Inst., Columbus, Ohio.
CONTINUATION OF THE SMALL-SCALE OPERATION OF A TRANSDUCER INFORMATION CENTER.
Final rept. for 15 Feb 64-15 Feb 65,
by W. E. Chapin, G. L. McCann, and W. H. Veazie.
15 Apr 65, 32p
Contract AF33 615 1819, Proj. 8222, Task 822203
FDL TR-65-30
Unclassified report

Descriptors: (*Information retrieval, Transducers), (*Transducers, Information retrieval), Data processing systems, Data storage systems.

Between 1959 and 1961, a committee was established in the Instrumentation Branch of the former Aeronautical Systems Division to make an accurate assessment of the state of the art of telemetry transducers with respect to progress in telemetry systems. One of the many conclusions reached by this committee was that a central organization was needed to collect and disseminate transducer information on a current basis. Battelle Memorial Institute, under Air Force Contract No. AF 33(657)-11083, contracted to determine essential requirements for establishment and operation of a transducer information center (TIC) to fulfill this need. On April 15, 1963, a pilot TIC was started to study types of information, sources of information, methods of handling transducer data, and the techniques for dissemination of helpful information. A project was initiated after April 15, 1964, under Air Force Contract No. AF 33(615)-1819 for the operation of a small-scale TIC. This project involved the collecting and processing of transducer information of all types into a storage and retrieval system. Accessions lists were prepared and distributed to the many participants included on the TIC distribution list. Approximately 250 technical and nontechnical requests for information were handled by the TIC staff during the past 12 months. (Author)

AD-614 896 Div. 32, 30
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ENDOCENTRIC CONSTRUCTIONS AND THE COCKE PARSING LOGIC,

by Jane Robinson. Mar 65, 21p Rept. no. P-3101
Unclassified report

Descriptors: (*Language, Analysis), Data processing systems, Coding, Digital computers, Dictionaries, Automatic.

Parsing logics employed in automatic determination of sentence structure are described that utilize routines that take advantage of the speed with which digital computers can repeat the same instructions over and over, changing only the values of some parameters at each cycle. An example of a parsing logic is that devised by John Cocke in 1960 that requires each structure recognized by the grammar to be analyzed into 2 and only 2 immediate constituents, this logic applying the rules of a context-free phrase structure grammar (D. G. Hayes. 'Automatic language-data processing,' Chapter 17 in 'Computer applications in the behavioral sciences,' Prentice-Hall, 1962.) The phrase structure grammar on which the Cocke parsing logic operates is essentially a table of constructions, its rules having 3 entries, one for the code (a descriptor) of the construction, the other 2 specifying the codes of the ordered pair of immediate constituents out of which it may be formed. The frequent occurrence of endocentric constructions (those whose syntactic properties are largely the same as those of one of their elements---the head) allows opportunities for eliminating duplicate codes from the same string of cycles of the parsing logic. (Presented at the International Conference on Linguistics, New York, May 1965)

AD-614 982 Div. 32, 18
CFSTI Prices: HC$4.00 MF$0.75

RAND Corp., Santa Monica, Calif.
COORDINATED WEAPONS PRODUCTION IN NATO: A STUDY OF ALLIANCE PROCESSES,
by E. Vandevanter, Jr. Nov 64, 108p
Rept. no. RM-4169-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Weapons, Production), (*Foreign policy weapons), Military organizations, Political science, Procurement.

This study analyzes and compares the ways in which nations can be encouraged to pool their efforts in military production. It begins by drawing a fundamental distinction between two methods that have been used, the 'institutional' and the 'permissive' systems. The institutional method is the theoretical ideal for arriving at arrangements for coordinated production. At its heart is the Armaments Committee, which coordinates the activities of a complex network of interlacing agencies, including the Production, Logistics, and Infrastructure section of the International Staff, the Military Committee, the Standing Group, and Ad Hoc Mixed Working Groups appointed for the specific weapons under discussion. In the permissive process, manufacturers interested in selling and governments interested in buying a given article can join in an international consortium to produce an already developed weapon. The permissive differs most obviously from the institutional system in that formative negotiations are conducted outside the formal NATO structure and the consortium is brought under NATO auspices only after the critical arrangements for control of the consortium have been made. The permissive system of coordinating production that has evolved in NATO's fifteen years has surpassed alternative methods because it is politically viable. Because NATO is not a government but a voluntary association of independent nations, mechanisms for centralized, unitary decision-making inevitably founder on the rocks of national sovereignty.

AD-614 993 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE CONTINGENT PRICING PROBLEM: SOME CONSIDERATIONS IN FORMULATING QUALITY INCENTIVES,
by Eugene P. Durbin. Apr 65, 16p
Rept. no. P-3124
Unclassified report

To be presented at the Conference on Quality Control and Industrial Statistics, Stanford University, May 7, 1965.

Descriptors: (*Commerce, Costs), (*Costs, Commerce), (*Government procurement, Costs), Quality control, Linear programming, Probability, Production, Sampling.

The primary point made is that government negotiators must allow for sampling variation and the fact that contractors will consider expected results as well as explicit payment scheduled.

AD-614 994 Div. 32
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
PUBLICATIONS OF THE SOCIAL SCIENCE DEPARTMENT, THE RAND CORPORATION, 1948-1965,
by Ian C. C. Graham and Bonnie Lieb. Apr 65, 88p
Memo. no. RM-3600-2
Unclassified report

Descriptors: (*Social sciences, Bibliographies), (*Bibliographies, Social sciences), (*Textbooks, Social sciences), Political science, Communism, USSR, Reports, Libraries.

This Memorandum contains a bibliography of unclassified books, Reports (R's), RAND Memoranda (RM's), Papers (P's), and Translations (T's) that have been issued by (or, in the case of books, published for) the Social Science Department of the RAND Corporation from its inception to March 31, 1965. It replaces RM-3600-1 issued in March 1964 (AD-431 730). RAND publications in the social sciences are listed under authors' names arranged alphabetically. Through the numerical finding lists it is also possible to locate quickly in the author index any item whose number is known. For convenience, a consolidated list of books in the social sciences is provided.

AD-614 999 Div. 32
CFSTI Prices: HC$4.00 MF$0.75

California Univ., Berkeley. Inst. of International Studies.
TRENDS IN SOCIAL SCIENCE RESEARCH IN LATIN AMERICAN STUDIES: A CONFERENCE REPORT,
by Seymour Martin Lipset and David E. Apter.
Mar 65, 112p
Grant AF AFOSR758 65, Proj. 9779, Task 9779 02
AFOSR 65-0713
Unclassified report

Descriptors: (*Social sciences, Scientific research), Sociology, Political science, Population, Military strategy, Military government, Theory, Training, Great Britain, United States.

Contents (Papers presented at a conference held at the Center for Advanced Study in the Behavioral Sciences, Palo Alto, Calif., Oct. 9-11, 1964):
Recent theories of development, by Ivan Vallier
Training for comparative and interdisciplinary studies, by Jane Fearer
A Latin American phenomenon: The middle class military coup, by Jose Nun.

AD-615 025 Div. 32, 12
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
A SELECTED BIBLIOGRAPHY OF RAND PUBLICATIONS ON SPACE RESEARCH, 1960-1964,
by H. S. Dordick and J. T. Sturak. Apr 65, 76p
Memo. no. RM-4508 (Abridged)
Unclassified report

Descriptors: (*Astronautics, Bibliographies), Space flight, Space probes, Economics, Political science, Interplanetary trajectories, Lunar probes, Lunar trajectories, Satellites (Artificial), Abstracting, Reports, Space environmental conditions.

The present is divided into two main parts: (1) A contents section sub-divided into eight subject categories--Economic and Political Implications of Space, Interplanetary Flight, Lunar Flight, Satellites, Space Applications, Space Operations, Space Science, and Space Technology. Titles of relative publications are listed serially by type under one or more of these categories. (2) A section consisting of abstracts of the publications arranged numerically by type: Books, Reports, RAND Memoranda, Papers, and Translations. (Author)

AD-615 035 Div. 32
CFSTI Prices: HC$5.00 MF$1.25

Air Force Flight Test Center, Edwards AFB, Calif.
AFFTC AUTHOR'S HANDBOOK,
Final rept.,
by Gene C. Lemmon and Hugh Watt. 1965, 196p
FTC TIH-65-2001
Unclassified report

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Descriptors: (*Handbooks, Reports), (*Reports, Preparation), Instruction manuals, Air Force, Data, Graphics, Printing, Documentation.

This handbook was prepared to guide AFFTC personnel in the preparation of technical reports. Chapter I includes details of the AFFTC technical reporting system. Chapter II includes specifications and standards for the various types of AFFTC reports. Chapter III includes details on data presentation such as a list of abbreviations; aeronautical symbols; and detailed instructions on table preparation, numeral presentation, mathematical and other symbols, etc. Details on graphic art and printing processes are included in Chapter IV to acquaint AFFTC personnel in these areas. (Author)

AD-615 046 Div. 32

Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio.
ON RELEVANCE AS A MEASURE,
by William Goffman. 1964, 4p
Grant AF AFOSR403 64
AFOSR 65-0589
Unclassified report

Pub. in Information Storage and Retrieval v2 p201-3 1964
(Copies available only to DDC users).

Descriptors: (*Information retrieval, Set theory), Communication theory, Search theory, Reports.

Relevance is defined as a measure of information conveyed by a document relative to a query. It is shown that the relationship between the document and the query, though necessary, is not sufficient to determine relevance. (Author)

AD-615 063 Div. 32

Duke Univ., Durham, N. C.
SOCIOMETRIC PATTERNS IN HYSTERICAL CONTAGION,
by Alan C. Kerckhoff, Kurt W. Back, and Norman Miller. Mar 65, 17p Technical rept. no. TR-16
Contract Nonr118111; Grant NSF GS89, Proj. NR177 470
Unclassified report

Pub. in SOCIOMETRY v28 n1 p2-15 Mar 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sociometrics, Social communication), (*Social communication, Sociometrics), Group dynamics.

Three theoretical bases are presented for making predictions about the relationship between sociometric patterns and the spread of hysterical contagion. These are derived from conceptualizations which emphasize the importance of 'group influence,' 'social isolation,' and 'crowd response.' The first two call for a greater proportion of cases among those integrated into a group and among social isolates, respectively, and the last calls for no relationship between sociometric position and being affected by the contagion. A theoretical synthesis is offered which calls for an over-representation of isolates at the beginning of the epidemic, a rapid spread through sociometric channels later, and finally a crowd reaction throughout the population involved. An attempt is made to put such phenomena into a general context of the diffusion of 'innovations.' (Expanded version of paper presented at the annual meeting of the American Sociological Assn., Montreal, Sept. 1964). (Author)

AD-615 108 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
EVALUATION OF SCIENCE COMMUNICATION SYSTEMS,
by Lawrence S. Papier. Feb 65, 48p
Special pub. CRDL-SP-4-65
Unclassified report

Descriptors: (*Information retrieval, Effectiveness), Communication systems, Analysis, Personnel, Management, Logistics, Control systems.

The report presents seven areas of investigation into which evaluators must probe to determine the overall worth of an information retrieval system (IRS). These are system objectives, user requirements, external relations, system properties, system efficiency, technical aspects, and operational aspects. Technical and operational personnel should participate in the evaluation. A determination of user requirements includes the following: (1) the types of communication necessary to fulfill user requirements, (2) user requirements in terms of system-response properties, (3) the ability of the system to provide the proper communications to the user, and (4) a quantitative and intuitive evaluation of fulfillment of user requirements. Two resultant listings (properties of system response and types of communications) form the basis of a coordinate grid that may be expanded to any degree necessary. (Author)

AD-615 130 Div. 32, 30
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
COMPUTER TECHNOLOGY AND SOCIAL CHANGE,
by Thomas C. Rowan. 23 Apr 65, 10p
Rept. no. SP-2007

Unclassified report

Talk given to The American Orthopsychiatric Assn., March 18, 1965.

Descriptors: (*Sociology, Computers), (*Computers, Sociology), Cybernetics, Automation, Labor.

This paper presents a discussion of the social, political, economic and psychological problems associated with the rapid growth and development of cybernetics and computer technology. Rather than reacting emotionally to real or imagined problems, a calm and intelligent approach on the part of public officials and responsible groups is required to increase public understanding of the computer as a powerful tool, to select appropriate applications of computer technology and to secure the maximum benefits for society in the future. (Author)

33. Transportation

AD-614 585 Div. 33, 1
CFSTI Prices: HC$5.00 MF$1.00

McDonnell Aircraft Corp., St. Louis, Mo.
STOL-V/STOL CITY CENTER TRANSPORT AIRCRAFT STUDY.
Final rept.
1 Oct 64, 174p McDonnell rept. no. B-122
Contract FA64WA5012
FAA-ADS 26

Unclassified report

Descriptors: (*Air traffic, Analysis), (*Civil aviation, Economics), (*Vertical take-off planes, Civil aviation), (*Short take-off planes, Civil aviation), (*Transport planes, Feasibility studies), Costs, Urban areas, Electronic equipment, Design, Airports, Factor analysis, Aircraft engines, Statistical data.

This is part of a study to investigate the economic feasibility of STOL and V/STOL transport aircraft operation from city center to city center. A comparison is made of design, performance, and direct operating costs of two V STOL and two STOL transport aircraft to be operational in 1975. The V/STOL aircraft in the study are a tilt wing-propeller type and a turbofan lift engine type. The STOL aircraft are the propeller deflected slipstream type and a STOL version of the tilt wing-propeller type. Propulsion systems are projected to a technological level that could be employed in an aircraft design initiated in 1970. Microminiaturization of electronic equipment is incorporated to the degree that is considered acceptable operationally and cost-wise by 1975. All aircraft are designed for a stage length of 500 statute miles, and performance and direct operating costs are shown for stage lengths of 50 to 750 miles and for aircraft gross weights of 40,000 to 100,000 pounds. Typical three-views are shown for one size of each of the four aircraft. The results of the parametric sizing study of each aircraft are shown as group weight breakdowns, mission performance, dimensional tabulations and curves, noise level profiles, and take-off and landing characteristics. (Author)

AD-614 598 Div. 33, 1
CFSTI Prices: HC$6.00 MF$1.25

Stanford Research Inst., Menlo Park, Calif.
AN ECONOMIC ANALYSIS OF COMMERCIAL VTOL AND STOL TRANSPORT AIRCRAFT.
Final rept.,
by Richard K. Waldo and Peter D. Tilton. Feb 65, 236p
Contract FA64WA4997, Proj. ISU4922
FAA-ADS 25

Unclassified report

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Descriptors: (*Transport planes, Feasibility studies), (*Civil aviation, Economics), (*Air traffic, Analysis), (*Vertical take-off planes, Civil aviation), (*Short take-off planes, Civil aviation), Air traffic control systems, Airports, Factor analysis, Urban areas, Statistical data, Costs, Design.

On the basis of the research undertaken in the preliminary study, it would appear that the provision of city-center V/STOL service would represent a somewhat marginal undertaking from the standpoint of both the air carrier and the aircraft manufacturing industries. The traffic potential for intercity V/STOL services and, accordingly, the market potential for commercial V/STOL aircraft would be quite limited. Indeed, the size indicated for this aircraft market suggests that commercial V/STOL development would be attractive only as a follow-on to a military program. This outlook could be changed through significant advances in the state of the art that would permit reductions in direct operating costs and through the availability of significant foreign markets for V/STOL aircraft.

How To Use Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and division number. A typical subject index entry is shown below.

*COMBUSTION
OSCILLATION
INTENTIONAL COMBUSTION
OSCILLATIONS IN PROPULSION
SYSTEMS
AD-608 206 DIV. 25

PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Division numbers and titles are also listed. Again, three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*BENDAT, JULIUS S.
* * *
ZERO CROSSINGS OF A SINE
WAVE PLUS RANDOM NOISE
AD-608 019 DIV. 15
* * *
SPECTRA AND AUTOCORRELATION
FUNCTIONS FOR FULLY DEVELOPED
SEAS AND PREDICTION OF STRUCTURAL
FATIGUE DAMAGE
AD-608 464 DIV. 2

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry (designated by an asterisk) for each document are listed the originator of the report, the originator's report number, the title, AD number, and division number. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parantheses directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown on the next page.

*SHEFFIELD UNIV (ENGLAND)
* * *
HIC 45
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
(AFOSR 64 2029)
AD-608 206 DIV. 25

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
* * *
64 2029
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
AD-608 206 DIV. 25

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and division number.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
LL TR 365
(ESD TDR64 378)
AD-608 272 DIV. 30
LL 1964 63
(ESD TDR64 566)
AD-608 288 DIV. 8

AD-DIVISION INDEX

The AD-Division Index is arranged numerically by AD number and lists the subject division where the full entry can be located in TAB.

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METALLURGY
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS.
AD-619 029 DIV. 17

PATENTS
ABSTRACTS OF U. S. PATENTS OBTAINED BY THE NOLC OFFICE OF PATENT COUNSEL 1957-1969.
AD-619 796 DIV. 32

•ACCIDENTS
BIOLOGICAL LABORATORIES
CAUSAL FACTORS IN MICROBIOLOGICAL LABORATORY ACCIDENTS AND INFECTIONS.
AD-619 012 DIV. 16

•ACIDS
CHEMICAL EQUILIBRIUM
REPRINT: ACIDITY OF HYDROCARBONS. EQUILIBRIUM ACIDITIES OF HYDROCARBON ACIDS IN CYCLOHEXYLAMINE.
AD-619 134 DIV. 4

•ACOUSTIC INSULATION
RUBBER COATINGS
STUDY OF RESONANT ABSORBERS FOR UNDERWATER SOUND.
AD-619 848 DIV. 25

•ACOUSTICS
STRUCTURES
RESPONSE OF MULTI-SPANNED BEAM AND PANEL SYSTEMS UNDER NOISE EXCITATION.
AD-619 830 DIV. 13

•ADAPTIVE CONTROL SYSTEMS
COMPUTER LOGIC
IDENTIFICATION OF PROCESS DYNAMICS IN COMPUTER-CONTROLLED ADAPTIVE SYSTEMS.
AD-619 691 DIV. 30

•ADENOSINE PHOSPHATES
RADIOBIOLOGY
TRANSLATION OF RUSSIAN RESEARCH: EFFECT OF ADENOSINETRI PHOSPHORIC ACID (ATP) ON THE METABOLISM OF PHOSPHO PROTEINES IN THE LIVER AT RADIATION INFLICTION.
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•ADSORPTION
GASES
STUDY OF ADSORPTION OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE.
AD-619 040 DIV. 25

•AERIAL PHOTOGRAPHY
CLOUD HEIGHT INDICATORS
IMPROVEMENTS ON THE RONNE SYSTEM OF CLOUD MEASUREMENTS FROM AIRCRAFT MOTION PICTURE FILMS.
AD-619 614 DIV. 2

•AEROBIOLOGY
SYMPOSIA
INTERNATIONAL SYMPOSIUM ON AEROBIOLOGY.
AD-619 709 DIV. 16

•AERODYNAMIC CHARACTERISTICS
BIBLIOGRAPHIES
AEROSONICS BIBLIOGRAPHY.
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AERODYNAMIC CONFIGURATIONS
EXPERIMENTAL INVESTIGATION INTO THE SHAPE OF THRUST AUGMENTING SURFACES IN CONJUNCTION WITH COANDA-DEFLECTED JET SHEETS.
AD-619 617 DIV. 9

•AEROELASTICITY
FLUTTER
TRANSLATION OF RUSSIAN RESEARCH: PROBLEMS OF PLATE FLUTTER IN NONLINEAR ARRANGEMENT.
AD-619 943 DIV. 9

•AIR
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PHASE EQUILIBRIA OF DRY AIR AT LOW PRESSURE.
AD-619 588 DIV. 25

•AIR EJECTORS
NOZZLES
TRANSLATION OF RUSSIAN PATENT: GREAT-PRESSURE-DROP GAS EJECTOR WITH ADDITIONAL NOZZLE.
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AD-619 820 DIV. 30

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APPLICATIONS OF INDUSTRIAL ENGINEERING IN THE UNITED STATES AIR FORCE.
AD-619 674 DIV. 23

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AD-619 589 DIV. 33
ECONOMIC ANALYSIS OF COMMERCIAL VTOL AND STOL TRANSPORT AIRCRAFT.
AD-619 598 DIV. 33

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•ALGEBRAS
GROUPS (MATHEMATICS)

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*AF30 602 2989
AIRBORNE INSTRUMENTS LAB DEER PARK N Y
(RADC TR-65-30)
AD-614 651 DIV. 25

*AF30 602 3089
SYRACUSE UNIV N Y COLL OF ENGINEERING
(RADC TR-64-560)
F AD-614 676 DIV. 8

*AF30 602 3197
TYCO LABS INC WALTHAM MASS
(RADC TR-65-6)
AD-614 986 DIV. 25

*AF30 602 3241
RCA LABS DIV RADIO CORP OF AMERICA PRINCETON N J
(RADC TR-65-2)
F AD-614 648 DIV. 8

*AF30 602 3298
NATIONAL ENGINEERING SCIENCE CO PASADENA CALIF
SN 169
(RADC TDR-64-467)
F AD-614 802 DIV. 25

*AF30 602 3278
MICROWAVE ASSOCIATES INC BURLINGTON MASS
(RADC TR-65-52)
AD-614 649 DIV. 8

*AF30 602 3298
MELABS PALO ALTO CALIF
(RADC TDR-64-496)
AD-614 971 DIV. 6

•AF30 602 3337
PHILCO BLUE BELL PA AERONUTRONIC DIV
2594 2
(RADC TR-64-510)
AD-614 906 DIV. 8

•AF30 602 3432
LFE ELECTRONICS BOSTON MASS
(RADC TR-64-538)
F AD-614 831 DIV. 20

•AF30 602 3569
ELECTRON PHYSICS LAB UNIV OF MICHIGAN ANN ARBOR
(RADC TR-64-589)
AD-615 190 DIV. 8

•AF33 608 940
NEW HAMPSHIRE UNIV DURHAM DEPT OF MECHANICAL ENGINEERING
AD-614 986 DIV. 13

•AF33 615 1068
METALS RESEARCH LAB CARNEGIE INST OF TECH PITTSBURGH PA
(ARL 65-19)
F AD-615 006 DIV. 25

•AF33 615 1121
DEFENSE METALS INFORMATION CENTER COLUMBUS OHIO
DMIC 214
AD-614 707 DIV. 17

•AF33 615 1124
RADIATION EFFECTS INFORMATION CENTER COLUMBUS OHIO
ACCESSION LIST NO. 86
AD-614 985 DIV. 20

•AF33 615 1819
BATTELLE MEMORIAL INST COLUMBUS OHIO
(FDL TR-65-30)
F AD-614 816 DIV. 32

•AF33 615 1892
SPACE/DEFENSE CORP BIRMINGHAM MICH
(AMRL TR-64-138)
F AD-614 933 DIV. 16

•AF33 615 64 1007
BUREAU OF MINES PITTSBURGH PA EXPLOSIVES RESEARCH CENTER
(APL TR-65-28)
F AD-614 694 DIV. 10

•AF33 616 7247
ELECTRO-OPTICAL SYSTEMS INC PASADENA CALIF
EOS 440 Q 2
AD-614 984 DIV. 8

•AF33 616 7818
AEROPHYSICS LAB MASS INST OF TECH CAMBRIDGE
(ARL 64-213)
AD-615 008 DIV. 9

•AF33 616 8493
CINCINNATI UNIV OHIO
(ARL 65-7)
AD-614 819 DIV. 20

•AF33 657 10892
WRIGHT AERONAUTICAL DIV CURTISS-WRIGHT CORP WOOD-RIDGE N J
(ARL 65-4)
F AD-614 907 DIV. 7

•AF33 657 11261
ALLEGHENY LUDLUM STEEL CORP BRACKENRIDGE PA
(RTD TR-8-109 (V))
AD-614 602 DIV. 26

•AF33 657 11324
IIT RESEARCH INST CHICAGO ILL
(ARL 65-1)
F AD-614 988 DIV. 25

•AF33 657 11715
ILLINOIS UNIV URBANA DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING
(ML TR-64-247 P1)
S AD-614 693 DIV. 1
(ML TR-64-248 P1)
S AD-614 830 DIV. 13

•AF33 657 1698
OHIO STATE UNIV COLUMBUS
(AMRL TR-65-19)
F AD-614 987 DIV. 16

•AF33 657 7154 GRANT
CALIFORNIA UNIV LOS ANGELES DEPT OF ENGINEERING
(AFOSR 65-0619)
AD-615 182 DIV. 30

•AF33 657 8106
OHIO STATE UNIV COLUMBUS
(ARL 65-45)
F AD-615 007 DIV. 9

•AF33 657 8491
INSTITUTE FOR AEROSPACE STUDIES UNIV OF TORONTO (ONTARIO)
UTIAS TN 77
AD-614 616 DIV. 9

•AF33 657 8600
BUNKER-RAMO CORP CANOGA PARK CALIF
2 64
F AD-614 828 DIV. 1

•AF33 657 8783
GENERAL DYNAMICS/ELECTRONICS ROCHESTER N Y PHYSICAL ELECTRONICS LAB
(AL TR-64-288)
F AD-614 891 DIV. 25

•AF41 609 1693
USAF RADIATION LAB UNIV OF CHICAGO ILL
AD-615 174 DIV. 16

•AF41 609 1769
BRYN MAWR COLL PA
(AAL TDR-64-14)
AD-615 010 DIV. 16
(AAL TDR-64-8)
AD-615 107 DIV. 16

•AF41 609 1973
KENT STATE UNIV OHIO
(AAL TDR-64-9)
AD-615 011 DIV. 16

•AF41 657 323
TEXAS CHRISTIAN UNIV FORT WORTH
(AAL TDR-63-41)
AD-614 825 DIV. 28

•AF41 657 343
AMERICAN FOUNDATION FOR BIOLOGICAL RESEARCH MADISON WIS
(AAL TDR-63-28)
AD-615 009 DIV. 16

•AF49 5 2110
NAVAL RESEARCH LAB WASHINGTON D C
NRL MR 1393
AD-614 899 DIV. 20

•AF49 638 1048
ILLINOIS UNIV URBANA DEPT OF PHYSICS
AD-615 082 DIV. 25
AD-615 083 DIV. 25

•AF49 638 1078
ACOUSTICS AND SEISMICS LAB UNIV OF MICHIGAN ANN ARBOR
AD-614 867 DIV. 2

•AF49 638 1122
AEROJET-GENERAL CORP AZUSA CALIF
(AFOSR 65-0695)
AD-615 133 DIV. 4

•AF49 638 1131
ATLANTIC RESEARCH CORP ALEXANDRIA VA
(AFOSR 65-0693)
AD-615 181 DIV. 4

•AF49 638 1207
GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y
GRD 119 PT. 1
AD-615 154 DIV. 12
GRD 119 PT. 2
(AFOSR 65-0602)
AD-615 155 DIV. 12

•AF49 638 1242
RIAS INC BALTIMORE MD
(AFOSR 65-0616)
AD-614 875 DIV. 15

•AF49 638 1245
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
AD-614 724 DIV. 25
AD-614 756 DIV. 25

•AF49 638 1254 GRANT
COLUMBIA UNIV NEW YORK
(AFOSR 65-0572)
AD-614 733 DIV. 21

•AF49 638 1263
POLYTECHNIC INST OF BROOKLYN FARMINGDALE N Y PROPULSION RESEARCH LAB
(AFOSR 65-0573)
AD-615 187 DIV. 27

•AF49 638 1271 GRANT
GAS DYNAMICS LAB PRINCETON UNIV N J
715
(AFOSR 65-0194)
AD-615 149 DIV. 30

•AF49 638 1276
STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS
SUDAER 192
(AFOSR 64-1317)
AD-614 928 DIV. 13

•AF49 638 1324
MIDWEST RESEARCH INST KANSAS CITY MO
(AFOSR 65-0247)
F AD-614 801 DIV. 9

•AF49 638 1389
ADVANCED KINETICS INC COSTA MESA CALIF
(AFOSR 65-0492)
F AD-614 790 DIV. 25

•AF49 638 1397
PHILCO RESEARCH LABS NEWPORT BEACH CALIF
QLR 64 15
AD-614 795 DIV. 10

•AF49 638 1402 GRANT
POLYTECHNIC INST OF BROOKLYN N Y DEPT OF ELECTRICAL ENGINEERING
(AFOSR 65-0423)
AD-614 847 DIV. 26

•AF49 638 984 GRANT
CATHOLIC UNIV SANTIAGO (CHILE)•
(AFOSR 65-0671)
F AD-614 741 DIV. 16

•AF49 638 641
KENT STATE UNIV OHIO

(AFOSR 65-0677)
AD-614 799 DIV. 4

•AF49 638 700
RAND CORP SANTA MONICA CALIF
RM 4931 PR
AD-614 639 DIV. 15
RM 4972 PR
AD-614 636 DIV. 15
RM 4969 PR
AD-614 982 DIV. 32
RM 4916 PR
AD-614 026 DIV. 25

•AF49 638 70018
RAND CORP SANTA MONICA CALIF
RM 4920 PR
AD-614 169 DIV. 12

•AF49 638 788 GRANT
PITTSBURGH UNIV PA
AD-614 718 DIV. 4

•AF49 638 864
ALLISON DIV GENERAL MOTORS
CORP INDIANAPOLIS IND
EDR 2187
(AFOSR 1280)
AD-614 109 DIV. 25

•AF49 638 944
CALIFORNIA UNIV BERKELEY
(AFOSR 65-0923)
AD-614 747 DIV. 4

•AF61 052 07
UPPSALA UNIV (SWEDEN)
SN 8
(AFCRL 62-284)
AD-615 192 DIV. 2

•AF61 052 134
OSLO UNIV (NORWAY)
IR 24
(AFOSR 65-0717)
AD-615 067 DIV. 25

•AF61 052 171
UPPSALA UNIV (SWEDEN)
SN 6
(AFCRL 62-137)
AD-615 078 DIV. 2

•AF61 052 496
MANCHESTER UNIV (ENGLAND)
DEPT OF ASTRONOMY
TN 4
AD-614 680 DIV. 2

•AF61 052 619
KIRUNA GEOPHYSICAL OBSERVATORY
(SWEDEN)
SR 2
(AFCRL 65-166)
AD-614 620 DIV. 2

•AF61 052 658
PHILIPPS-UNIVERSITAT MARBURG
(GERMANY) INST FUR THEORETISCHE
PHYSIK
(AFOSR 65-0649)
AD-614 843 DIV. 20
(AFOSR 65-0648)
AD-614 845 DIV. 20
(AFOSR 65-0646)
AD-614 846 DIV. 25
(AFOSR 65-0650)
AD-615 151 DIV. 20

•AF61 052 669
UNIVERSITY COLL OF WALES
CARDIFF
SR 4
(AFCRL 65-182)
AD-614 621 DIV. 25

•AF61 052 796
ROYAL INST OF TECH STOCKHOLM
(SWEDEN) MICROWAVE DEPT
(RADC TR-65-173)
F AD-614 654 DIV. 25

•AF61 052 808
MILAN UNIV (ITALY) ISTITUTO
DI SCIENZE FISICHE
SR 4
(AFCRL 65-225)
AD-614 918 DIV. 2

•AF61 058 658
PHILIPPS-UNIVERSITAT MARBURG
(GERMANY) INST FUR THEORETISCHE
PHYSIK
(AFOSR 65-0647)
AD-614 849 DIV. 20

•ARDS630
MAXSON ELECTRONICS CORP GREAT
RIVER N Y
(SRDS RD-64-151)
F AD-614 841 DIV. 19

•DA ARO D31 124 448
FLORIDA STATE UNIV TALLAHASSEE
(AROD 4222:2)
AD-614 739 DIV. 14

•DA ARO D31 1246238
STANFORD UNIV CALIF DEPT
OF AERONAUTICS AND ASTRONAUTICS
SUDAER 216
(AROD 4702:1)
AD-614 808 DIV. 25

•DA ARO D31 1246588
MICHIGAN UNIV ANN ARBOR
COLL OF LITERATURE SCIENCE
AND THE ARTS
03105 36 T
AD-615 085 DIV. 30

•DA ARO D31 1246607
YALE UNIV NEW HAVEN CONN
(AROD 893:95)
AD-614 858 DIV. 20

•DA AROD31 1246448
FLORIDA STATE UNIV TALLAHASSEE
(AROD 4222:4)
AD-615 137 DIV. 4

•DA AROD31 1246548
CALIFORNIA UNIV BERKELEY
(AROD 362:61)
AD-614 732 DIV. 15

•DA AROD31 1246683
CALIFORNIA UNIV BERKELEY
(AROD 362:61)
AD-614 732 DIV. 15

•DA ENG27 021 6262
MIAMI UNIV CORAL GABLES FLA
(CRREL RR-127)
AD-614 781 DIV. 2

•DA MD49 193 63671
DENVER GENERAL HOSPITAL COLO
AD-615 074 DIV. 16

•DA TC49 17761
INSTITUTE FOR AEROSPACE STUDIES
UNIV OF TORONTO (ONTARIO)
UTIAS TN 79
AD-614 617 DIV. 9

•DA11 0220RD2059
MATHEMATICS RESEARCH CENTER
UNIV OF WISCONSIN MADISON
MRC TSR 542
AD-614 810 DIV. 15
MRC TSR 548
AD-614 811 DIV. 15
MRC TSR 549
AD-614 812 DIV. 15
MRC TSR 556
AD-614 813 DIV. 15
MRC TSR 551
AD-614 930 DIV. 25
MRC TSR 552
AD-614 931 DIV. 15
MRC TSR 540
AD-614 933 DIV. 15
MRC TSR 544
AD-614 934 DIV. 15
MRC TSR 546
AD-614 935 DIV. 15
MRC TSR 545
AD-614 937 DIV. 15
MRC TSR 10
AD-615 132 DIV. 15

•DA11 0220RD2059 GRANT
MATHEMATICS RESEARCH CENTER
UNIV OF WISCONSIN MADISON
MRC TSR 547
AD-614 939 DIV. 15

•DA11 0220RD2059
MATHEMATICS RESEARCH CENTER
UNIV OF WISCONSIN MADISON
MRC TSR 536
AD-614 929 DIV. 9
MRC TSR 554
AD-614 932 DIV. 15

•DA11 190ENG13
MINNESOTA UNIV MINNEAPOLIS
(CRREL RR-96)
AD-614 780 DIV. 2

•DA18 035AMC191A
FRANKLIN INST PHILADELPHIA
PA
AD-615 126 DIV. 25

•DA18 108AMC209A
WISCONSIN UNIV MADISON
AD-615 122 DIV. 4

•DA19 020ORD4938
MASSACHUSETTS INST OF TECH
CAMBRIDGE
(AROD 1935.3-E)
F AD-614 689 DIV. 9

•DA23 072ORD1251
SOUTHWEST RESEARCH INST SAN
ANTONIO TEX
TR 9
AD-614 686 DIV. 9

•DA28 043AMC00073E
COORDINATED SCIENCE LAB UNIV
OF ILLINOIS URBANA
R 252
AD-614 800 DIV. 8

•DA28 043AMC00091E
RABINOW ELECTRONICS INC ROCKVILLE
MD
AD-614 643 DIV. 30

•DA28 043AMC00150E
MOTOROLA INC PHOENIX ARIZ
SEMICONDUCTOR PRODUCTS DIV
AD-615 128 DIV. 8

•DA28 043AMC00389S
RADIATION INC MELBOURNE FLA
AD-615 020 DIV. 8

•DA30 069AMC534A
INSTITUTE OF OPTICS UNIV OF
ROCHESTER N Y
AD-614 659 DIV. 25
AD-614 901 DIV. 30

•DA30 069ORD1560
MICROWAVE RESEARCH INST POLYTECHNIC
INST OF BROOKLYN N Y
R 745 59
AD-614 691 DIV. 30

•DA30 069ORD2646
MICROWAVE RESEARCH INST POLYTECHNIC
INST OF BROOKLYN N Y
R 745 59
AD-614 691 DIV. 30

•DA30 069ORD2918
MALAKER LABS INC HIGH BRIDGE
N J
103 12
F AD-615 124 DIV. 4

•DA31 124ARO D128
HARVARD UNIV CAMBRIDGE MASS
(AROD 1617 49)
AD-615 044 DIV. 15

•DA31 124ARO D223
STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS SUDAER 216
(AROD 4702:1)
AD-614 808 DIV. 25

•DA31 124ARO D99
DEFENSE RESEARCH CORP SANTA BARBARA CALIF
(AROD 4157:4)
F AD-614 615 DIV. 25

•DA31 124AROD124
DUNHAM LAB YALE UNIV NEW HAVEN CONN
(AROD 4313:7)
AD-615 136 DIV. 25

•DA31 124AROD128
HARVARD UNIV CAMBRIDGE MASS
(AROD 1617:46)
AD-614 859 DIV. 15

•DA31 124AROD161
MINNESOTA UNIV MINNEAPOLIS DEPT OF CHEMISTRY
(AROD 2062:10)
AD-615 185 DIV. 4

•DA31 124AROD317
VANDERBILT UNIV NASHVILLE TENN DEPT OF CHEMISTRY
(AROD 4283:2)
AD-615 190 DIV. 25

•DA31 124AROD90
STEVENS INST OF TECH HOBOKEN N J DEPT OF CHEMISTRY AND CHEMICAL ENGINEERING
(AROD 3930:2)
AD-615 188 DIV. 4

•DA33 008ORD1916
INDIANA UNIV BLOOMINGTON
AD-614 690 DIV. 4

•DA36 039AMC01457
NATIONAL CO INC MELROSE MASS
AD-614 611 DIV. 8

•DA36 039AMC01463E
TEXAS INSTRUMENTS INC DALLAS
03 65 19
AD-614 798 DIV. 6

•DA36 039AMC01479E
MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV
AD-614 919 DIV. 8

•DA36 039AMC01477E
SPERRY MICROWAVE ELECTRONICS CO CLEARWATER FLA
SJ222 0045 6
AD-614 644 DIV. 8

•DA36 039AMC01480E
NATIONAL SEMICONDUCTOR CORP DANBURY CONN
F AD-614 829 DIV. 8

•DA36 039AMC02294E
GEORGIA INST OF TECH ATLANTA ENGINEERING EXPERIMENT STATION
28
AD-614 803 DIV. 8

•DA36 039AMC02314E
UNION CARBIDE CORP PARMA OHIO
R 4
F AD-615 160 DIV. 7

•DA36 039AMC02349E
THOMAS J WATSON RESEARCH CENTER YORKTOWN HEIGHTS N Y
AD-615 147 DIV. 25

•DA36 039AMC02355E
TRW SEMICONDUCTORS INC LAWNDALE CALIF
TRWS 46 RD F
F AD-615 127 DIV. 8

•DA36 039AMC02365E
TRG INC MELVILLE N Y
AD-615 162 DIV. 8

•DA36 039AMC03187E
MICROWAVE ASSOCIATES INC BURLINGTON MASS
AD-614 573 DIV. 8

•DA36 039AMC03250E
TEXAS INSTRUMENTS INC DALLAS
U6 802400 6
AD-614 712 DIV. 25

•DA36 039AMC03334E
CHRYSLER CORP HUNTSVILLE ALA
AD-615 001 DIV. 8

•DA36 039AMC03409E
GENERAL ELECTRIC CO SCHENECTADY N Y
F AD-614 569 DIV. 8

•DA36 039AMC03617E
WESTINGHOUSE ELECTRIC CORP ELKRIDGE MD
F AD-614 604 DIV. 8

•DA36 039AMC03622E
GENERAL INSTRUMENT CORP DARLINGTON S C CAPACITOR DIV
AD-614 989 DIV. 8
AD-615 097 DIV. 8

•DA36 039AMC03632E
TEXAS INSTRUMENTS INC DALLAS
03 65 09
AD-614 799 DIV. 8

•DA36 039AMC03637E
TEXAS INSTRUMENTS INC DALLAS
TI 03 64 76
AD-614 599 DIV. 8
03 65 16
AD-614 822 DIV. 8

•DA36 039AMC03640E
BLILEY ELECTRIC CO ERIE PA
AD-614 583 DIV. 8

•DA36 039SC78968
RCA DEFENSE ELECTRONIC PRODUCTS CAMDEN N J
AD-614 624 DIV. 8

•DA36 039SC88967
ITT ELECTRON TUBE DIV ROANOKE VA
3235A
AD-614 926 DIV. 8

•DA36 039SC88972
VALPEY FISHER CORP HOLLISTON MASS
AD-614 924 DIV. 8

•DA36 039SC89111
MARINE LAB UNIV OF MIAMI CORAL GABLES FLA
7
AD-614 706 DIV. 2

•DA44 009AMC240T
ALLIS-CHALMERS MFG CO MILWAUKEE WIS
AD-614 717 DIV. 7

•DA44 177AMC116T
AVIATION SAFETY ENGINEERING AND RESEARCH PHOENIX ARIZ
AVSER 64 11
(TRECOM TR-65-6)
F AD-614 582 DIV. 1

•DA44 188ARO2
HUMAN RESOURCES RESEARCH OFFICE GEORGE WASHINGTON UNIV ALEXANDRIA VA
TR 65 1
AD-614 606 DIV. 23

•DA44 146XZ129
MASSACHUSETTS INST OF TECH CAMBRIDGE SCHOOL OF ENGINEERING
R63 53
(DASA 1442)
AD-615 017 DIV. 13

•DA49 193MD2063
INDIANA UNIV BLOOMINGTON
AD-614 752 DIV. 28

•DA49 193MD2238
MARYLAND UNIV COLLEGE PARK
(TT 65-62173)
AD-615 144 DIV. 16
AD-615 145 DIV. 16

•DA49 193MD2281
IIT RESEARCH INST CHICAGO ILL
IITRI L6021 2
AD-614 970 DIV. 16

•DA49 193MD2838
WAKOFF RESEARCH CENTER STATEN ISLAND N Y
AD-615 101 DIV. 28

•DA49 193MD2971
MASSACHUSETTS UNIV AMHERST DEPT OF FOOD AND NUTRITION
AD-614 910 DIV. 29

•DA49 193MD2621
BOSTON UNIV MEDICAL CENTER MASS
A AD-614 850 DIV. 16

•DRB9512 22
BRITISH COLUMBIA UNIV (VANCOUVER)
AD-614 750 DIV. 25

•DRB9931 10
OTTAWA UNIV (ONTARIO)
AD-614 757 DIV. 8

•FA NAF176
ALLEGHENY LUDLUM STEEL CORP BRACKENRIDGE PA
(FAA-ADS 28)
AD-614 913 DIV. 27

•FA SS65 3
NORTH AMERICAN AVIATION INC LOS ANGELES CALIF
NA65 247
(FAA SST-65-5)
F AD-615 170 DIV. 10

•FAA BRD322
SPERRY GYROSCOPE CO GREAT NECK N Y
EB 5260 0390
(SRDS RD-64-88)
F AD-614 622 DIV. 1

•FA64WA4997
STANFORD RESEARCH INST MENLO PARK CALIF
(FAA-ADS 25)
F AD-614 598 DIV. 33

•FA64WA5012
MCDONNELL AIRCRAFT CORP ST LOUIS MO
B 122
(FAA-ADS 26)
F AD-614 585 DIV. 33

•FA64WA5151
LITTLE (ARTHUR D) INC CAMBRIDGE MASS
(FAA ADS 36)
AD-614 914 DIV. 1

•GP2633
OPERATIONS RESEARCH CENTER
UNIV OF CALIF BERKELEY
ORC 64 19(RR)
AD-619 179 DIV. 15

•NASW849
RIAS INC BALTIMORE MD
(AFOSR 65-0616)
AD-619 879 DIV. 15

•NAS8 1174
LOCKHEED MISSILES AND SPACE
CO PALO ALTO CALIF
AD-619 098 DIV. 2

•NAS8 1549
GRUMMAN AIRCRAFT ENGINEERING
CORP BETHPAGE N Y
GRD 119 PT. 1
AD-619 154 DIV. 12
GRD 119 PT. 2
(AFOSR 65-0603)
AD-619 155 DIV. 12

•NBY13009
COLUMBIA UNIV NEW YORK DEPT
OF CIVIL ENGINEERING AND
ENGINEERING MECHANICS
AD-619 693 DIV. 12

•NIH AM08527
CALIFORNIA UNIV SAN FRANCISCO
MEDICAL CENTER
AD-619 139 DIV. 16

•NIMH MY5504
NAVY MEDICAL NEUROPSYCHIATRIC
RESEARCH UNIT SAN DIEGO
CALIF
64 20
AD-619 159 DIV. 28

•N08SR89167
SOUTHWEST RESEARCH INST SAN
ANTONIO TEX
SR 19
AD-619 172 DIV. 19

•N08SR89201
LEAR SIEGLER INC GRAND RAPIDS
MICH INSTRUMENT DIV
GRR 65 1049
AD-619 922 DIV. 30

•N08SR89334
GENERAL ELECTRIC CO SYRACUSE
N Y ELECTRONICS LAB
AD-619 100 DIV. 30

•N08SR89427
HUGHES AIRCRAFT CO FULLERTON
CALIF GROUND SYSTEMS GROUP
FR 65 14 72
F AD-619 921 DIV. 8

•N08SR89462
MICROWAVE ASSOCIATES INC BURLINGTON
MASS
F AD-619 123 DIV. 8

•N08SR91299
GENERAL ELECTRIC CO AUBURN
N Y SEMICONDUCTOR PRODUCTS
DEPT
AD-619 037 DIV. 8

•N08S89440
AMERICAN MONARCH CORP MINNEAPOLIS
MINN
AD-619 572 DIV. 7

•N08S90084
ENGINEERING RESEARCH ASSOCIATES
TORONTO (ONTARIO)
ERA 93 1
AD-619 837 DIV. 9
ERA 93 2
AD-619 838 DIV. 9

•N08S90267
AMERICAN OIL CO WHITING IND
AD-619 593 DIV. 14

•NONR 60002S 64
CHICAGO UNIV ILL
F AD-619 715 DIV. 2

•NONR 60007 64
CALIFORNIA UNIV LOS ANGELES
F AD-619 987 DIV. 16

•NONR 56235
BROWN UNIV PROVIDENCE R I
8
AD-619 691 DIV. 25

•NONR-118111
DUKE UNIV DURHAM N C
TR 17
AD-619 988 DIV. 30

•NONR113505
BERMUDA BIOLOGICAL STATION
ST GEORGE'S WEST
F AD-619 791 DIV. 2

•NONR118111 GRANT
DUKE UNIV DURHAM N C
TR 16
AD-619 063 DIV. 32

•NONR120224
WISCONSIN UNIV MADISON
AD-619 603 DIV. 32

•NONR122421 GRANT
MICHIGAN UNIV ANN ARBOR
COLL OF LITERATURE SCIENCE
AND THE ARTS
03105 36 T
AD-619 089 DIV. 30

•NONR122436
COOLEY ELECTRONICS LAB UNIV
OF MICHIGAN ANN ARBOR
TR 163
S AD-619 705 DIV. 8

•NONR122448
MICHIGAN UNIV ANN ARBOR
AD-619 069 DIV. 2

•NONR122810
CARNEGIE INST OF TECH PITTSBURGH
PA GRADUATE SCHOOL OF INDUSTRIAL
ADMINISTRATION
MSRP 32
AD-619 086 DIV. 26

•NONR122820
NORTHWESTERN UNIV EVANSTON
ILL DEPT OF MATERIALS SCIENCE
TR 5
AD-619 692 DIV. 25

•NONR128610 GRANT
OREGON STATE UNIV CORVALLIS
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OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index

1. Aircraft and Flight Equipment

No entries

2. Astronomy, Geophysics and Geography

AD-454 572 Div. 2
CFSTI Price: HC$5.00

Texas Instruments, Inc., Dallas.
WORLDWIDE COLLECTION AND EVALUATION OF EARTHQUAKE DATA. EVALUATION OF 1963 SEISMICITY.
Final rept.,
by Ray Fisher and Ralph Guidroz. 18 Nov 64, 187p
Contract AF19 604 8517, Proj. 8652; ARPA Order 292
Task 865207
AFCRL 64-964
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Earthquakes, Data), (*Seismic waves, Earthquakes), Geology, Seismology, Seismological stations, Frequency, Computers, Pacific Ocean, Pacific Ocean islands, Atlantic Ocean, Atlantic Ocean islands, Distribution, Maps, Polarization.

Seismic activity in 1963 is documented and compared to 1960 and other years. Other studies undertaken over the past three years are reviewed and summarized. The worldwide level of seismicity in 1963 is shown to have been considerably lower than in 1960. Comparison with Gutenberg and Richter's (1954) data shows 1963 seismic activity about average with respect to total shocks M sub S greater than or equal to 6.0. However, more shocks in the range 5.0 less than or equal to M sub S <6.0 were recorded in 1963 than predicted by Gutenberg and Richter (1954). Epicenter maps showing events for which M sub S greater than or equal to 4.0 and m sub b greater than or equal to 4.0 for shallow and normal focus and also for intermediate and deep focus events are included. A seismicity map based on annual numbers of shocks (5.0 less than or equal to M sub S <6.0) per unit area is also shown. (Author)

Patent 3,175,152 Div. 2

TRANSISTORIZED WIND SPEED INDICATING AND RECORDING SYSTEM.
Patent assigned to Army,
by Franklin R. Shafer. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Anemometers, Data transmission systems), (*Data transmission systems, Semiconductor devices), (*Semiconductor devices, Data transmission systems), Recording systems, Photoelectric cells (Semiconductor), Transistors, Circuits.

An anemometer is supported on a shaft which carries on the other end a perforated disc. The disc is positioned between a light source and a phototransistor so that the light beam is interrupted as the disc rotates. Current flow from the transistor may travel long distances over a pair of wires. The system includes a threshold circuit, a differentiating circuit, a linear integrator and other components including resistors.

PB-167 173 Div. 2, 20
CFSTI Prices: HC$4.00 MF$0.75

Commissariat a l'Energie Atomique, Saclay (France).
Centre d'Etudes Nucleaires.
DETECTION OF ATMOSPHERIC TRITIUM BY SCINTILLATION. VARIATIONS IN ITS CONCENTRATION IN FRANCE (Detection du Tritium Atmospherique par Scintillation. Evolution de sa Concentration en France)
Doctoral thesis,
by Roland Bibron. 1965, 102p CEA-R-2629
Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Atmospheric sounding, Tritium), (*Atmosphere, Tritium), (*Tritium, Atmosphere), Scintillation counters, Rainfall, Hydrogen, Air, Strontium, Radioactive isotopes, Electrolysis, Synthesis (Chemistry), Determination, France.

The tritium released into the atmosphere as a result of the explosion of thermonuclear devices is a useful radio-active tracer for the study of certain geophysical problems. The low concentrations found however call for the use of extremely sensitive detectors. Two detection methods using liquid scintillators are described. In the first method, the sample is introduced into the scintillator in liquid form, after prior concentration of the tritium by electrolysis. In the second method the tritium is incorporated into the scintillator solvent molecule by chemical synthesis. In the last part of the report are examined the variations in the tritium concentration in rain-water and of the free hydrogen in the air in France. A discussion is then made of the seasonal variations in the case of rain-water and these are compared to the variations in the strontium-90 concentrations. (Author)

PB-167 176 Div. 2
CFSTI Prices: HC$3.00 MF$0.50

Meteorological Satellite Lab., Weather Bureau,
Washington, D. C.

CALCULATIONS OF THE EARTH'S SPECTRAL RADIANCE FOR LARGE ZENITH ANGLES,
by D. Q. Wark, J. Alishouse, and G. Yamamoto.
Oct 63, 51p Rept. no. MSL-21
Unclassified report

Descriptors: (*Infrared radiation, Earth), (*Earth, Infrared radiation), Atmosphere, Atmospheric refraction, Water vapor, Carbon dioxide, Numerical analysis.

The infrared spectral radiance has been calculated near the limb of the earth, using a curved refracting atmosphere. Radiance was calculated in narrow spectral intervals for eight atmospheric models representing a wide range of meteorological conditions. Comparison is made of the radiance across the limb for four of the model atmospheres in several narrow spectral intervals; two hypothetical filters are then convoluted with spectral radiance to show the effective radiance across the limb, as it might be viewed by a horizon sensor. The results indicate that the 15-micron carbon dioxide band and the rotational water vapor band are best suited for horizon sensing; and that neither is decisively superior on the basis of radiance. It is also shown that radiative flux calculated using the exact radiance values near the limb is only about 1 percent more precise than that calculated from an extrapolation to the limb of radiance values determined at zenith angles where the plane parallel approximation is valid. Comparisons are made between the results of this work and the results of studies by other authors. (Author)

PB-167 178 Div. 2, 12, 24
CFSTI Prices: HC$4.00 MF$1.00

Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
TROPOSPHERIC CONDITIONS OVER THE TROPICAL ATLANTIC AS OBSERVED BY TWO TIROS SATELLITES AND RESEARCH AIRCRAFT DURING 22 SEPTEMBER 1962,
by H. McClure Johnson and Robert W. Fett.
Jun 64, 117p Rept. no. MSL-29
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Meteorological satellites, Aerial photography), (*Weather forecasting, Meteorological satellites), (*Aerial photography, Cloud cover), (*Marine meteorology, Atlantic Ocean), Aircraft, Meteorological parameters, Meteorological charts, Photographs, Troposphere.

PB-167 180 Div. 2, 12, 24
CFSTI Prices: HC$2.00 MF$0.50

Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
WIND SPEEDS FROM TIROS PICTURES OF STORMS IN THE TROPICS,
by A. Timchalk, L. F. Hubert, and S. Fritz.
Feb 65, 41p Rept. no. MSL-33
Unclassified report

Descriptors: (*Weather forecasting, Meteorological satellites), (*Wind, Tropical cyclones), (*Tropical cyclones, Wind), (*Meteorological satellites, Aerial photography), Photographic analysis, Photographic techniques, Meteorological parameters.

An empirical technique is developed by which the maximum wind speeds in hurricanes can be estimated from satellite picture data. Two parameters are derived from pictures: a size measurement and a ranking of the degree of spiral band organization. The picture data are plotted versus the maximum wind speeds derived, in most cases, from airplane reconnaissance of 1962 typhoons in order to develop the technique. Similar data from the 1963 hurricane season are used for testing the method. Preliminary results indicate the estimated speeds may be accurate to about ±20 kt. The rules developed for assessing the picture data are discussed and illustrated. The results at this stage indicate that some of the subjectivity may be removed by measuring the angles between the spiral bands and concentric circles and by defining a simpler size parameter. Speculatively, the reason for the empirical results could involve the vertical motion field of storms that is associated with the angular momentum budget, and the development of critical values of shear and stability. (Author)

PB-167 195 Div. 2, 6, 22
CFSTI Prices: HC$5.00 MF$1.25

Institute of Tech., Univ. of St. Louis, Mo.
SEISMIC WAVES GENERATED BY CHEMICAL EXPLOSIONS.
Final rept.,
by Carl Kisslinger, Emil J. Mateker, Jr., and Thomas V. McEvilly. 31 Jul 63, 180p
Contract AF19 604 7402, Proj. 8652, ARPA Order 180 61, Task 865201
AFCRL 63-701; AD 423 980 Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Seismic waves, Explosion effects), (*Explosion effects, Seismic waves), Seismology, Underground explosions, Chemicals, Explosive materials, Geophysics, Seismographs, Data, Graphics, Earthquakes, Nuclear explosions, Identification systems, Detection.

Seismograms from some 160 small charges, one 500 pound surface burst, one 100 ton surface charge, and a buried charge of 10 tons were recorded at close range. The experiments involving the small charges were designed to elucidate a variety of aspects of the generation of seismic waves by explosive sources. The principal subjects investigated were: (1) The properties of source functions obtained by phase equalization of dispersed surface waves recorded at close range; (2) the effect on surface waves of distributing the charge in space and time; (3) the effect of source depth on the properties of the compressional and Rayleigh waves; (4) the effect of the medium at the shot on the properties of the seismic signal; and (5) the properties of the horizontally polarized shear waves generated by an explosion.

PB-167 201 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
MARINE GRAVITY OBSERVATIONS,
Preliminary rept.,
by Hyman Orlin. Aug 61, 31p Unclassified report

Descriptors: (*Marine geophysics, Gravity), (*Gravity, Marine geophysics), Pacific Ocean, Geological survey, Oceanographic vessels, Instrumentation, Oceanographic data.

This report covers the gravity meter program from San Francisco, California to Kodiak, Alaska. Gravity data obtained on two subsequent cruises south of Kodiak are appended to this report without comment.

PB-167 202 Div. 2, 19, 33
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
PHOTOGRAMMETRIC SURVEYS FOR AERONAUTICAL CHARTING,
by L. W. Swanson. 1961, 10p
Unclassified report

Submitted at the Consultation on Cartography, Commission on Cartography of the Pan American Institute of Geography and History, Buenos Aires, Argentina, 1-15 Aug 61.

Descriptors: (*Photogrammetry, Navigation charts), (*Navigation charts, Air traffic control systems), (*Air traffic control systems, Navigation charts), Civil aviation, Air traffic, Flight paths, Mapping, Terminal flight facilities, Aeronautics.

One of the principal functions of the Coast and Geodetic Survey is to provide aeronautical charts for the United States and territories and photogrammetric surveys to supply data for this purpose have been a part of the aeronautical charting activity for the last 20 years. Photogrammetric surveys are applied primarily to the location of aids to air navigation, and to the mapping and gathering of data at civil airports and along the runway approaches. This monograph is a brief summary of the history of this work and a description of present practices.

PB-167 203 Div. 2, 19, 33
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
PHOTOGRAMMETRIC MEASUREMENT OF TIDAL CURRENTS,
by Joseph E. Waugh. 1963, 22p
Unclassified report

Presented at Water Resources Engineering Conference of the American Society of Civil Engineers held in Schroeder Hotel, Milwaukee, Wisconsin, 15 May 63.

Descriptors: (*Photogrammetry, Tides), (*Tides, Photogrammetry), Hydrographic surveying, Seacoast, Oceanology, Navigation charts, Water traffic.

Techniques and equipment for photogrammetric measurement of tidal currents are described.

PB-167 204 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
PLANS FOR GEODESY IN THE NEXT DECADE,
by H. Arnold Karo. 1962, 16p
Unclassified report

Presented at 1962 Annual Conference, Division of Earth Sciences, National Academy of Sciences, National Research Council, 12 May 62.

Descriptors: (*Geodesics, Scientific research), Potential theory, Satellites (Artificial), Gravity, Earth, Configuration, Measurement, Research program administration.

The use of a surface of constant gravitational potential and an orbiting earth satellite in future geodetic work is outlined.

PB-167 205 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
REPORT ON SEISMOLOGY TO THE COMMITTEE ON SEISMOLOGY COMMISSION ON CARTOGRAPHY PAN AMERICAN INSTITUTE OF GEOGRAPHY AND HISTORY,
by Dean S. Carder. Jan 61, 8p
Unclassified report

Submitted at the Consultation on Cartography (no. 9) Buenos Aires, Argentina, 1-15 Aug 61.

Descriptors: (*Seismology, Reports), Earthquakes, Seismographs, Data Processing systems, Geophysics, Oceanology.

PB-167 206 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Rockville, Md.
Washington Science Center.
TIDAL DATUM PLANE CHANGES PRINCE WILLIAM SOUND, ALASKAN EARTHQUAKES MARCH-APRIL, 1964.
Preliminary rept.
Sep 64, 8p
Unclassified report

Descriptors: (*Alaska Gulf, Tides), (*Tides, Alaska Gulf), (*Earthquakes, Alaska), Surveying.

The earthquake of March 27, 1964, which occurred near Prince William, Alaska, caused considerable land movement, both upward and downward along the coast. The report is for the purpose of recording what was done and to give tidal datum plane changes for locations for which the data are available. Greater precision in tidal datum planes determinations is possible as more tide observation are obtained. For this reason the changes in tidal datum given in the report are considered as preliminary and subject to change.

PB-167 208 Div. 2, 24
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
HORIZONTAL AND VERTICAL INSTRUMENT AEROTRIANGULATION,
by Lawrence W. Swanson. 1959, 13p
Unclassified report

For presentation at the Seminar on Aerial Survey Methods and Equipment under sponsorship of United Nations held in Bangkok, Thailand, 4 Jan-5 Feb 60.

Descriptors: (*Photogrammetry, Stereoscopic map plotters), (*Stereoscopic map plotters, Photogrammetry), Aerial photographs, Correlation techniques, Mapping, Terrain, Surveying, Geodesics.

Instrument aerotriangulation is a procedure by which a series of overlapping aerial photographs are connected to enable their orientation for stereoscopic mapping without the need for geodetic control within the limits of each photograph. The instrument aerotriangulation is a three-dimensional traverse which can be compared with the more familiar terrestrial survey traverse in that, (1) both are indirect methods of measurement for determining the distance and azimuth between control points at the terminals of the strip, and (2) both result in errors of closure which must be eliminated by adjustment.

PB-167 209 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
THE PRACTICAL USE OF THE OREGON STATE PLANE COORDINATE SYSTEM,
by Buford K. Meade. 1964, 28p
Unclassified report

For presentation at the Surveying and Mapping Conference, Oregon State Univ., Corvallis, 27 Mar 64.

Descriptors: (*Mapping, United States), Map projection, Graphics, Geodesics, Theory.

The paper consists of three parts as follows: Development of and use of the State coordinate systems. Example computations based on the Oregon State coordinate system and discussion of corrections for reduction of geodetic data to the grid. Discussion of a method for the adjustment of traverse surveys where corrections to observed angles and measured lengths are obtained from the adjustment.

PB-167 210 Div. 2, 13, 30
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
CONCEPTS IN COORDINATE SURVEYING,
by Charles Pierce. 1961, 10p
Unclassified report

Presented at Plenary Session, Annual Meeting of the American Congress on Surveying and Mapping (no. 21) Shoreham Hotel, Washington, D. C., 22 Mar 61.

Descriptors: (*Surveying, Reviews), (*Geodesics, Surveying), (*Civil engineering, Surveying), Position finding, Satellites (Artificial), Mapping.

PB-167 211 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
ELECTRONIC COMPUTATION IN SURVEYING AND MAPPING,
by H. Arnold Karo. 1960, 15p
Unclassified report

For presentation at the Annual Meeting of the Canadian Institute of Surveying held in Ottawa, Canada, 10-12 Feb 60.

Descriptors: (*Surveying, Data processing systems), (*Mapping, Data processing systems), (*Computers, Civil engineering), (*Civil engineering, Data processing systems), Programming (Computers), Geodesics.

This report describes the types of problems that are being processed with the IBM 650 computer and mentions some of the techniques used in the solution of these problems. The major portion of the work relates to the adjustment of triangulation. The classical method of adjustment by variation of coordinates on the ellipsoid was adopted as the basis for most of the work. The only information needed as 'input' are the geographic positions of the fixed or previously adjusted control points, lists of observed directions and approximate geographic positions of the new points which are to be adjusted. Values determined from field computations are generally adequate for use as these approximate positions.

PB-167 219 Div. 2, 12
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
A STUDY OF SATELLITE REQUIREMENTS FOR THREE-DIMENSIONAL GEODESY,
by George F. Wirth. Oct 63, 40p
Unclassified report

Descriptors: (*Astronomical geodesics, Satellites (Artificial)), (*Satellites (Artificial), Geodesics), Optical tracking, Effectiveness, Costs, Feasibility studies.

The objective of this study is to compare self-illuminated satellites (active) with sun-reflecting satellites (passive) to determine which is more feasible for use in an optical observing program of world-wide satellite triangulation. Factors affecting this program are geometrical configuration between the orbit of the satellite and the actual network of triangulation stations, darkness, weather, optical observability of the satellite, satellites available or proposed, progress of the project, logistics, and cost. The conclusions of this study revealed that while the active satellites (Starlight type) have somewhat more observational ability, the passive satellites (Echo type) are more feasible because of their lower cost. Use of two Echo satellites for the program would have less cost and more expedient progress than the use of one Starlight satellite. Anna type satellites, limited to the generation of a few flashes in a specific orbit, are considered less feasible than Echo type satellites on two counts--greater cost and reduced number of images observed. The recommendations of this study support the use of passive type satellites in a scheme of world-wide satellite triangulation. (Author)

PB-167 298 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
SEISMOGRAPH STATION ABBREVIATIONS. Revised ed.
Aug 63, 33p
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Seismological stations, Directories), Seismology, Earthquakes, Data, Standardization, Seismographs.

The seismograph station abbreviations listed in this publication have been adopted by the U. S. Coast and Geodetic Survey to facilitate data handling and reporting in the computer program for epicenter determination. These abbreviations will be used to identify stations or station readings in such publications as the Preliminary Determination of Epicenter cards, Seismological Bulletins, and the weekly Earthquake Data Reports. The listing should not be construed as a representation of only stations presently in operation. Many of the stations included are now inactive, however, their data are still used for various seismological studies. Supplements to this list will be issued for new stations. (Author)

PB-167 301 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
IS SEA LEVEL FALLING OR THE LAND RISING IN S. E. ALASKA,
by Charles Pierce. 1960, 13p
Unclassified report

Presented at Annual Meeting (20th), American Congress on Surveying and Mapping, held at the Shoreham Hotel, Washington, D. C., 20-23 Mar 60
Available copy will not permit fully legible reproduction.

Descriptors: (*Tides, Alaska), (*Hydrology, Alaska), Oceans, Depth finding, Theory.

Results are presented of a special tidal survey made in 1959 to provide values of tidal datum planes.

PB-167 351 Div. 2, 30
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
HYDROGRAPHIC AUTOMATIC DATA PROCESSING,
by H. Arnold Karo. 1962, 12p
Unclassified report

Presented at International Hydrographic Conference (8th) Monaco, May 8-18, 1962.

Descriptors: (*Hydrographic surveying, Data processing systems), (*Data processing systems, Hydrographic surveying), Oceanographic data, Electronic recording systems, Mapping, Plotters, Hydrographic sonar, Computers.

A study of means of applying data processing techniques to the collection, processing, and plotting of hydrographic data is presented. As a first step, it is proposed that a survey ship be equipped with data acquisition equipment that will record and store all data needed to accomplish a hydrographic survey in a form acceptable to a computer.

3. Chemical Warfare Equipment and Materials

No entries

4. Chemistry

ANL-6771 Div. 4, 20
CFSTI Prices: HC$2.00 MF$0.50

Argonne National Lab., Ill.
CALORIMETRIC METHODS FOR THE ASSAY OF FUEL PINS AND RESIDUES,
by N. M. Lazar, S. Rosen, and A. B. Shuck.
Nov 64, 35p
Contract W-31-109-ENG-38 Unclassified report

Descriptors: (*Reactor fuels, Chemical analysis), (*Calorimeters, Nuclear engineering).

LA-3184 Div. 4, 20, 25
CFSTI Prices: HC$2.00 MF$0.50

Los Alamos Scientific Lab., Univ. of California, N. Mex.

IDEAL GAS THERMODYNAMIC FUNCTIONS OF LANTHANIDE AND ACTINIDE ELEMENTS,
by Roy C. Feber and Claude C. Herrick.
1 Dec 64, 37p
Contract W-7405-ENG-36
Unclassified report

Descriptors: (*Rare earth elements, Thermodynamics), (*Actinide series, Nuclear energy levels).

Patent 3,174,876 Div. 4

PROCESS FOR SEPARATING SUGARS.
Patent assigned to Agriculture,
by John B. Stark. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Sucrose, Separation), Monosaccharides, Glucose, Carbohydrates, Ion exchange resins, Alkali metal compounds, Salts, Patents.

Suchrose is separated from monosaccharides such as glucose by applying to an ion exchange resin in the alkali metal salt form an aqueous solution containing sucrose and a monosaccharide in a given ratio. The resin is then washed. Portions of the effluent are then collected in two steps.

Patent 3,174,921 Div. 4

POLYMERIZATION OF ISOBUTYLENE.
Patent assigned to AEC,
by Max S. Matheson. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Alkenes, Polymerization), (*Polyethylene plastics, Synthesis (Chemistry)), Ultraviolet radiation, Radiation chemistry, Aliphatic compounds, Elastomers, Patents.

Isobutylene is polymerized by irradiating a mixture of equal parts of isobutylene and isopentane in a vacuum with ultraviolet light having a wave length lower than 1600 A. at between -150 and -160 degrees C.

PB-167 380 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Union Carbide Research Inst., Tarrytown, N. Y.
FLUORINE OXIDIZERS.
Quarterly technical summary rept. no. 5, 1 Jun-1 Sep 64,
by R. H. Toeniskoetter and F. P. Gortsema. 1 Sep 64, 23p
Contract DA31 124ARO D77, Proj. 4134C, ARPA Order 402
AD 447 573
Unclassified report

Descriptors: (*Oxidizers, Synthesis (Chemistry)), (*Fluorides, Chlorine compounds), (*Chlorine compounds, Fluorides), Oxygen compounds, Cesium compounds, Azides, Perchlorates, Potassium compounds, Bromine compounds, Platinum compounds, Ions, Chemical reactions, Decomposition, Crystal structure, Spectra (Infrared).

Chloryl fluoride reacts with cesium fluoride at 0-25 to produce a solid having a limiting composition near 'CsF2'.

The solid, however, possesses little oxidizing strength. Reaction of chloryl fluoride with cesium oxide gives a solid product containing cesium, fluorine and chlorine in variable composition. These experiments gave no evidence indicating the formation of a stable fluorochlorate salt, Cs2ClO3F, or of a difluorochlorate salt, CsClO2F2. Chloryl fluoride and chlorine trifluoride react with cesium azide with formation of fluorine-containing solids. These reactions are being studied as possible routes to fluorine-nitrogen anions. The reaction of potassium perchlorate with bromine trifluoride gives nearly quantitative yields of chloryl fluoride and only minor amounts of perchloryl fluoride. Platinum hexafluoride and chlorine trifluoride react to form chlorine pentafluoride and the solid compound ClF3.PtF5. Thermal decomposition of this substance produces fluorine, chlorine trifluoride and platinum tetrafluoride. (Author)

5. Communications

No entries

6. Detection

Patent 3,175,213 Div. 6, 8

TRACKING RADAR SYSTEMS.
Patent assigned to Navy,
by Arthur A. Varela. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Radar tracking, Patents), (*Radar antennas, Phased arrays), Lens antennas, Phase control devices, Phase shift, Waveguides, Circuits.

A passive waveguide lens arrangement is utilized in this radar system to produce the required phase relationship. The employment of the lens eliminates the need of previously used active drive circuits in which phase fidelity must be insured.

Patent 3,176,295 Div. 6

MONOPULSE RADAR SYSTEM.
Patent assigned to Army,
by George M. Kirkpatrick and Lewis J. Neelands.
30 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Monopulse radar, Radar tracking), (*Radar tracking, Monopulse radar), Radar receivers, Target angle, Electronics, Radar targets, Patents.

A receiver is provided for detecting error signals which measure the deviation of a target from the boresight axis of a combination amplitude-phase comparison monopulse type radar system. Elements are provided responsive to the detected target signals whereby there is produced a first sum and a first difference signal at a prescribed IF, but with the difference signal shifted in phase with respect to the signal. The phase angle is a measure of the deviation of the target from the boresight axis of the system.

Patent 3,178,712 Div. 6, 1, 5

ANTI-COLLISION SYSTEM.
Patent assigned to Army,
by Robert T. Fitzgerald and Klaus H. Sann. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Aviation safety, Monitors), (*Communication systems, Aviation safety), (*Monitors, Aviation safety), Radio transmitters, Radio receivers, Display systems, Antennas, Patents, Aviation accidents, Airborne.

The anti-collision warning or communication is for use with moving aircraft to prevent collisions between the moving aircraft. The system is utilized in ground and air installations. The system includes receiving and transmitting antennas, transmitters and receivers and other components. The system supplements radar by supplying relative altitude and heading information which is displayed on a visual indicator. An aural alarm may also be given.

PB-167 188 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: ACUSHI.
May 63, 50p
Proj. 173 7
AD 407 778
Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismological stations, Standardization), (*Seismology, Nuclear explosions), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the ACUSHI event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 196 Div. 6, 2, 22
CFSTI Prices: HC$3.00 MF$0.75

Rensselaer Polytechnic Inst., Troy, N. Y.
WATER WELLS IN EARTHQUAKE AND EXPLOSION DETECTION.
Final rept.,
by William Carragan, Frank Michalko, and Samuel Katz. 26 Jun 64, 90p
Contract AF19 604 8376, Proj. 8652, ARPA Order 180 61, Task 865 204
AFCRL 64-177; AD 443 378 Unclassified report

Rept. on Proj. VELA-UNIFORM.

Descriptors: (*Liquid level gages, Seismographs), (*Seismology, Instrumentation), (*Detection, Seismology), (*Hydrology, Seismology), Earthquakes, Microseisms, Explosions, Identification systems, Detectors, Water, Oscillation, Transducers.

Earthquakes and microseisms were detected for two years through observations of water-level fluctuations in open wells and pressure fluctuations in a capped well. The transducer system composed of aquifer and detector can be adjusted to provide sensitivity comparable with long-period inertial seismographs, and bandpass extended significantly in both directions. The wells have recorded all of the phases normally detected by long-period inertial seismographs; they appear to be equally sensitive to Love and Rayleigh waves. Criteria were established for predicting the suitability of wells for seismic detection, using relatively simple float-recorder equipment. (Author)

PB-167 213 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: DAMON I.
Sep 63, 6p
Proj. 173 7
Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This shot report is issued on behalf of the Advanced Research Projects Agency, Department of Defense, to provide information which may prove of value in the study of data from nuclear tests. The data contained in this report are preliminary and subject to later revision as may be necessary.

PB-167 214 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: CHENA.
Jul 63, 5p
Proj. 173 7
Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This shot report is issued to provide information which may prove of value in the study of data from nuclear tests. The data contained in this report are preliminary and subject to later revision as may be necessary.

PB-167 215 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: CHINCHILLA II.
Jul 63, 44p
Proj. 173 7
Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the CHINCHILLA II event at the Nevada Test Site (NTS) by the Standard Stations. Recordings from Coast and Geodetic Survey stations, having instrumentation similar to that of the Standard Stations, are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 216 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: MINK.
29 Oct 61, 25p
Proj. 173 7
Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the MINK event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at the Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 217 Div. 6, 2
CFSTI Prices: HC$3.00 MF$0.75

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: MERRIMAC.
Jun 63, 58p
Proj. 173 7
Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

A World-Wide Network of Standardized Seismograph Stations (WWNSS) is being established under VELA-UNIFORM Project, to provide standardized short and long period instruments for the recording of seismic data.

This program was initiated to provide improved instrumentation for the recording of world-wide seismic activity and to eliminate, as far as possible, uncertainties in the analysis of seismic data due to differences in instrumentation. This report comprises a presentation of seismic data recorded from the MERRIMAC event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 218 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: STILLWATER,
Apr 63, 44p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the STILLWATER event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosive and earthquake seismic sources.

PB-167 220 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: SHREW.
Jul 63, 5p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the SHREW event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 221 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: TENDRAC.
Feb 63, 52p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the TENDRAC event at the Nevada Test Site (NTS) by the standard stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to those of the standard stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosive and earthquake seismic sources.

PB-167 222 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: WICHITA.
Sep 63, 46p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the WICHITA event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 223 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: WHITE.
Sep 63, 6p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the WHITE event at the Nevada Test Site

(NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 224 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: SACRAMENTO.
Jul 63, 42p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
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Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the SACRAMENTO event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 225 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: PACA.
Sep 63, 6p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the PACA event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 226 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: NUMBAT.
Jun 63, 6p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the NUMBAT event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 227 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: PLATTE.
Jul 63, 41p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site (NTS). The data used are recorded by the Standard Stations and certain supplementary stations having instruments with response characteristics similar to those of the Standard Station instruments. These, and other data will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources.

PB-167 228 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: DES MOINES.
Apr 63, 43p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the DES MOINES event at the Nevada

Test Site (NTS) by the standard stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 229 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: DEAD.
Sep 63, 6p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the DEAD event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 230 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: JOHNNY BOY.
Sep 63, 5p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the JOHNNY BOY event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 231 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: HOOSIC.
Sep 63, 6p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the HOOSIC event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 232 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: PLATYPUS.
Jun 63, 5p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the PLATYPUS event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 233 Div. 6, 2
CFSTI Prices: HC$3.00 MF$0.75

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: CIMARRON.
Jul 63, 56p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the CIMARRON event at the Nevada Test Site (NTS) by the Standard Stations. Recordings from the Coast and Geodetic Survey stations, having instrumentation similar to that of the Standard Stations, are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 234 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: RINGTAIL,
Apr 63, 41p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data from the RINGTAIL event at the Nevada Test Site (NTS) as recorded by the Standard Stations. These data are supplemented by recordings from other Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of seismic methods for distinguishing between artificial explosion and earthquake sources.

PB-167 235 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: SEDAN,
Aug 63, 50p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site (NTS). The SEDAN event was a nuclear cratering experiment in the U. S. Atomic Energy Commission's Plowshare program. The data used were recorded by the Standard Stations and certain supplementary stations having instruments with response characteristics similar to those of the Standard Station instruments. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources.

PB-167 236 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: DORMOUSE PRIME.
Jun 63, 50p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the DORMOUSE PRIME event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at the Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 237 Div. 6, 2
CFSTI Prices: HC$3.00 MF$0.75

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: HAYMAKER,
27 Jun 62, 56p

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the HAYMAKER event at the Nevada Test Site (NTS) by the standard stations. These data are supplemented by recordings at Coast and Geodetic Survey stations as well as stations of other networks having instruments similar to the standard stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 238 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: HYRAX.
Sep 63, 46p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the HYRAX event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 239 Div. 6, 2
CFSTI Prices: HC$3.00 MF$0.75

Coast and Geodetic Survey, Washington, D. C.

WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: AARDVARK.
Nov 63, 66p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site (NTS). The data used are recorded by the Standard Stations and certain supplementary stations having instruments with response characteristics similar to those of the Standard Station instruments. These and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources.

PB-167 240 Div. 6, 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: AGOUTI.
Jun 63, 46p
Proj. 173 7

Unclassified report

Rept. of Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the AGOUTI event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 241 Div. 6, 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: ERMINE.
May 63, 26p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the ERMINE event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at the Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 242 Div. 6, 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: HARDHAT.
Apr 63, 46p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the HARDHAT event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 243 Div. 6, 2, 20
CFSTI Prices: HC$3.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: FISHER.
Mar 63, 51p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
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Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the FISHER event at the Nevada Test Site (NTS) by the standard stations. These data are supplemented by recordings at other Coast and Geodetic Survey and supporting stations having instruments similar to those of the standard stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 244 Div. 6, 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.

WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: DORMOUSE.
Aug 63, 45p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
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Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the DORMOUSE event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 245 Div. 6, 2, 20
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: HUDSON.
Sep 63, 5p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the HUDSON event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 246 Div. 6, 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: ANTLER.
Jun 63, 47p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the ANTLER event at the Nevada Test Site (NTS) by Coast and Geodetic Survey and other stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 247 Div. 6, 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: ALLEGHENY.
Sep 63, 46p
Proj. 173 7

Unclassified report

Rept. of Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the ALLEGHENY event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 248 Div. 6, 2, 20
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: LITTLE FELLER II.
Sep 63, 5p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the LITTLE FELLER II event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 249 Div. 6, 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.

WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: FEATHER.
Jul 63, 26p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the FEATHER event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at the Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 250 Div. 6, 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: KAWEAH.
Jun 63, 44p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the KAWEAH event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 251 Div. 6, 2, 20
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: MADISON.
Mar 63, 43p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the MADISON event at the Nevada Test Site (NTS) by the standard stations. These data are supplemented by recordings from Coast and Geodetic Survey stations and the Saint Louis University station at Manhattan, Kansas having instruments similar to those of the standard stations. Also readings from the Berkeley and Pasadena Networks were used for hypocenter determination. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 252 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: LITTLE FELLER I.
Sep 63, 5p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 271 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: PACKRAT.
Jul 63, 48p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the PACKRAT event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at Coast and Geodetic Survey stations with instruments having response characteristics similar to the standardized instruments. These and other data will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake sources.

PB-167 272 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.

WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: RACCOON.
Sep 63, 6p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the RACCOON event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies diected toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 273 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: PASSAIC.
Sep 63, 45p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

The World-Wide Network of Standardized Seismograph Stations (WWNSS) is being established under VELA-UNIFORM Project to provide standardized instrumentation for the recording of seismic data. This program was initiated to provide improved instrumentation for recording world-wide seismic activity and to aid in the elimination of uncertainties in the analysis of seismic data due to differences in instrumentation. This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site (NTS). The data used are recorded by the Standard Stations and certain supplementary stations having instruments with response characteristics similar to those of the Standard Station instruments. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources.

PB-167 274 Div. 6, 2
CFSTI Prices: HC$3.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: PEBA.
Sep 63, 52p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site (NTS). The data used were recorded by the Standard Stations and certain supplementary stations having instruments with response characteristics similar to those of the Standard Station instruments. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources.

PB-167 275 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: SMALL BOY.
Sep 63, 42p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the SMALL BOY event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 276 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD SEISMIC MEASUREMENTS: ROANOKE.
Aug 63, 40p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

The World-Wide Network of Standardized Seismograph Stations (WWNSS) is being established under VELA-UNIFORM Project to provide standardized instrumentation for the recording of seismic data. This program was initiated to provide improved instrumentation for recording world-wide seismic activity and to aid in the elimination of uncertainties in the analysis of seismic data due to differences in instrumentation. This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site (NTS). The data used are recorded by the Standard Stations and certain supple-

mentary stations having instruments with response characteristics similar to those of the Standard Station instruments. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources.

PB-167 277 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: BLACK.
Sep 63, 6p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the BLACK event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 278 Div. 6, 2
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: STOAT.
May 63, 44p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the STOAT event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 279 Div. 6, 2
CFSTI Prices: HC$3.00 MF$0.75

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: ARMADILLO.
May 63, 5p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the ARMADILLO event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Station are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 280 Div. 6, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: EEL.
Sep 63, 5p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data recorded from the EEL event at the Nevada Test Site (NTS) by the Standard Stations. Recordings at Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations are used as supplementary data. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

7. Electrical Equipment

AD-274 381 Div. 7
CFSTI Prices: HC$2.00
Eagle-Picher Co., Joplin, Mo.
RESEARCH ON AMMONIA BATTERY SYSTEM.
Quarterly rept. no. 6, 1 Oct 61-1 Jan 62,
by D. J. Doan, L. R. Wood, and E. M. Morse.
1 Jan 62, 40p
Contract DA36 039sc85396, Proj. 3A99 09 001

Unclassified report

Descriptors: (*Electrolytic cells, Batteries and components), (*Ammonia, Electrolytics),(*Electrolytes, Ammonia), (*Batteries and components, Electrolytic cells), Primary cells, Wet cells, Nitrocellulose, Cathodes (Electrolytic cell), Materials, Polarization, Electro chemistry, Mercury compounds, Sulfates, Carbon black.

Activation of two 6-cell batteries at -65 F confirmed the initial performance with about 5 to 7 seconds

activation time, and 40-50% coulometric efficiency. Units at 165 F developed sufficient temperature to expel cell electrolyte and fail in 15 to 30 seconds. This condition has been alleviated to the extent of obtaining about 0.25 second activation with 40% efficiency. The effects of pre-ammoniation of mercury sulphate on cell behavior is being studied. Tafel curve data have been developed showing polarization by type and electrode. Nitrocellulose cathode has been tried and presently shows possibilities for low rate application. (Author)

Patent 3,175,104 Div. 7

HIGH VOLTAGE ELECTRIC GENERATOR.
Patent assigned to AEC,
by Cyril D. Curtis. 23 Mar 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Generators, Variable capacitors), (*Variable capacitors, Generators), Electric power production, Capacitance, Diodes, Fixed capacitors, Voltage, Patents.

The device includes a variable capacitor whose capacitance is cyclically varied and two fixed capacitors. An initial charge is placed on one or more of the capacitors. Diodes are used to series connect the fixed capacitors across the variable capacitor responsive to the decrease in capacitance thereof and to parallel connect the fixed capacitors across the variable capacitor responsive to the increase in capacitance thereof, whereby the charge on the variable capacitor is increased. The output of the generator is taken across the variable capacitor.

8. Electronics and Electronic Equipment

AD-275 108 Div. 8, 26
CFSTI Price: HC$2.00

Clevite Corp., Cleveland, Ohio.
CERAMIC I-F TRANSFORMERS.
Quarterly rept. no. 1, 1 Dec 61-28 Feb 62,
by D. J. Koneval and D. R. Curran. 26 Mar 62, 28p
Rept. no. 22
Contract DA36 039SC87275, Proj. 30241G,
Task 3A99 15 002 05

Unclassified report

Descriptors: (*Ceramic materials, Transformers), (*Transformers, Intermediate frequency), (*Radiofrequency filters, Ceramic materials), (*Resonators, Performance (Engineering)), Ferroelectric materials, Band-pass filters, Piezoelectric effect, Electroplating, Vapor plating, Tuning devices, Miniature electronic equipment, Reliability (Electronics), Metal films, Electrical networks, High frequency, Frequency shift.

Realization of piezoelectric ceramic filters and networks in the form of two dimensional wafers depends principally on the existence of well behaved dot-resonators, and appropriate methods for controlling their characteristics. An investigation into the adjustment of dot-resonator frequency by control of electrode thickness was made. Electroplating techniques have produced frequency changes of 200 kc at 10 Mc before the resonator response degrades. Evaporation techniques have produced 300 kc changes without deleterious effects. Feasibility of packaging Uni-Wafer filters was demonstrated. (Author)

AD-282 835 Div. 8, 26
CFSTI Price: HC$2.00

Clevite Corp., Cleveland, Ohio.
FERROELECTRIC CERAMIC FILTERS, IF TRANSFORMERS, AND NETWORKS.
Quarterly rept. no. 2, 1 Mar-31 May 62,
by D. J. Koneval and D. R. Curran. 30 Jun 62, 33p
Rept. no. 23
Contract DA36 039SC87275, Proj. 302410, Task
3A99 15 002 05

Unclassified report

Descriptors: (*Resonators, Performance (Engineering)), (*Transformers, Intermediate frequency), (*Radiofrequency filters, Ceramic materials), (*Ceramic materials, Radiofrequency filters), Miniature electronic equipment, Band-pass filters, Ferroelectric materials, Tuning devices, Electroplating, Vapor plating, Vacuum apparatus, Quartz resonators, Crystal filters, Metal films, Electrical networks, Piezoelectric effect, Silver, Copper, Electrodes, High frequency, Frequency shift.

Uni-Wafer filters with 5 and 7 dot-resonators per ceramic wafer were fabricated at 10 mc with pass bandwidths of 670 kc and 270 kc respectively. In each case the individual dot-resonator was tuned to frequency by adjusting the thickness of its electrodes by electroplating. Forward and reverse electroplating of silver on silver or copper base electrodes was used to shift characteristic frequencies by more than ±400 kc. Vacuum deposition presents a second method for tuning resonators, with an improvement in resonant resistance over electroplating. From the literature on quartz resonators it was surmised that many of the techniques used in ceramic filters should also be applicable to quartz. This was demonstrated to be the case with the fabrication and testing of several narrow band quartz T-section ladder filters centered at 10 mc. (Author)

AD-401 160 Div. 8
CFSTI Price: HC$2.00

Clevite Corp., Cleveland, Ohio.
FERROELECTRIC CERAMIC FILTERS, IF TRANSFORMERS, AND NETWORKS.
Quarterly rept. no. 4, 1 Sep-30 Nov 62,
by D. J. Koneval and D. R. Curran. 25 Jan 63, 45p
Rept. no. 25
Contract DA36 039SC87275, Proj. 302410,
Task 3A99 15 002 05

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Ceramic material, Radiofrequency filters), (*Transformers, Intermediate frequency), (*Radiofrequency filters, Ceramic materials), (*Ferroelectric materials, Electric filters), (*Resonators, Performance (Engineering)), Piezoelectric effect, Miniature electronic equipment, Quartz, Reliability (Electronics), High frequency, Crystal filters, Electrical networks.

The total frequency range for piezoelectric ceramic filters, which at present extends from below 1 kc to above 12 mc, is discussed. Modes of vibration suitable for

each portion of this range are described. Ceramic uni-wafer ladder filters were developed at 10 mc using wafers of wedge-shaped cross section with 11 and 15 dot-resonators per filter. The range of action, i.e. the distance within which a disturbance appreciably affects the performance of a dot-resonator, was shown to be anisotropic in AT-cut quartz wafers. Experiments using mechanical damping indicate ranges of action of the order of 3 wafer thicknesses (3t) and 14t in the z' and x directions respectively; while those concerning interresonator coupling in half-lattice uni-wafer filters indicate that range of action should be in excess of 9t in both directions, but somewhat larger in the x direction. Quartz ladder filter measurements are presented and measurement techniques discussed. (Author)

AD-408 626 Div. 8, 26
CFSTI Price: HC$2.00

Clevite Corp., Cleveland, Ohio.
FERROELECTRIC CERAMIC FILTERS, IF TRANSFORMERS, AND NETWORKS.
Quarterly rept. no. 5, 1 Dec 61-28 Feb 63,
by D. R. Curran and D. J. Koneval. 23 Apr 63, 37p
Rept. no. 26
Contract DA36 039SC87275, Proj. 302410,
Task 3A99 15 005 05

Unclassified report

Descriptors: (*Ceramic materials, Radiofrequency filters), (*Transformers, Intermediate frequency), (*Radiofrequency filters, Ceramic materials), (*Ferroelectric materials, Electric filters), (*Resonators, Performance (Engineering)), Electrical networks, Quartz resonators, Piezoelectric effect, High frequency, Propagation, Band-pass filters, Attenuation.

Application of existing theory for the propagation of elastic waves in thin plates appears to give a plausible explanation for the behavior of high frequency AT-cut quartz resonators and dot-resonators on flat wafers. Experimental measurements of inter-resonator coupling and interaction between resonator and wafer edge appear to be in agreement with theory. Parallel combinations of quartz and ceramic resonators yield a strong zero and pole of impedance corresponding to resonance and anti-resonance of the ceramic, a strong zero of impedance corresponding to resonance of the quartz, and a very weak pole contributed by the antiresonance of the quartz. The addition of parallel quartz resonators with appropriately located frequencies to a ceramic ladder filter should yield stable poles of attenuation defining the edge of the pass band without otherwise affecting the pass band behavior. Thickness expander resonators made of hot-pressed ceramic have substantially improved resonant response characteristics at 12 mc over those using conventionally fabricated ceramic. (Author)

AD-416 492 Div. 8, 26
CFSTI Price: HC$7.15

ARINC Research Corp., Washington, D. C.
SEMICONDUCTOR RELIABILITY.
Final rept.,
by George J. Blakemore, Edward T. Kronson, and William H. von Alven. 31 Jul 63, 416p
Pub. no. 239-01-4-383
Contract NObsr87664

Unclassified report

See also AD-403 120.

Descriptors: (*Semiconductor devices, Reliability (Electronics)), (*Reliability (Electronics), Semiconductor devices), Life expectancy, Electrical properties, Statistical distributions, Statistical analysis, Monte Carlo method, Sampling, Tables, Quality control.

The main objectives of the program were to determine quality assurance requirements for specific semiconductor devices, and to determine confidence limits for the shape parameter beta of the Weibull distribution. The program was conducted with the cooperation of the JS-11 Committee on Sampling Procedures of the Joint Electron Device Engineering Council (representing device manufacturers). (Author)

AD-418 263 Div. 8, 26
CFSTI Price: HC$3.00

Clevite Corp., Cleveland, Ohio.
FERROELECTRIC CERAMIC FILTERS, IF TRANSFORMERS, AND NETWORKS.
Quarterly rept. no. 6, 1 Mar-31 May 63,
by D. R. Curran and W. J. Gerber. 16 Jul 63, 52p
Rept. no. 27
Contract DA36 039SC87275, Proj. 302410,
Task 3A99 15 005 05

Unclassified report

Descriptors: (*Ceramic materials, Radiofrequency filters), (*Transformers, Intermediate frequency), (*Radiofrequency filters, Ceramic materials), (*Ferroelectric materials, Electric filters), (*Resonators, Performance (Engineering)), Quartz resonators, Electrical networks, High frequency, Theory, Propagation, Transport properties, Piezoelectric effect, Hot working.

Research was continued towards the development of ferroelectric ceramic filters, intermediate frequency transformers, and networks. Energy trapping is proposed as an explanation for the behavior of high frequency AT-cut quartz resonators. Energy trapping gives a theoretical basis for the high Q sub m observed for quartz resonators mounted on low Q supports and for the low inter-resonator coupling observed for multi-resonator wafers. Measurements in support of the energy trapping theory have been obtained with AT-cut quartz wafers by measuring inter-resonator coupling and the coupling between resonator and an absorbing edge of the wafer. Some improvement has been obtained in piezoelectric ceramic thickness resonators by using hot-pressing fabrication techniques. Results are discussed for three ceramic fabrication techniques.

AD-423 977 Div. 8, 26
CFSTI Price: HC$2.00

Clevite Corp., Cleveland, Ohio.
FERROELECTRIC CERAMIC FILTERS IF TRANSFORMERS, AND NETWORKS.
Quarterly rept. no. 7, 1 Jun-31 Aug 63,
by D. R. Curran and W. J. Gerber. 14 Nov 63, 26p
Rept. no. 28
Contract DA36 039SC87275E, Proj. 302410,
Task 1G6 22001A057 05

Unclassified report

Descriptors: (*Ceramic materials, Radiofrequency filters), (*Transformers, Intermediate frequency), (*Radiofrequency filters, Ceramic materials), (*Ferroelectric materials, Electric filters), (*Resonators, Performance (Engineering)), Quartz resonators, Metal films, Electric terminals, Capacitance, Silver, Aluminum, Gold, Electromagnetic shielding, Electrical networks.

Experimental and theoretical investigations have demonstrated feasibility of multi-resonator filter

networks as an integral part of a single AT-cut quartz wafer. Theory has been extended with the numerical evaluation of the eigen-frequencies for the first 6 inharmonic overtone modes as functions of two-dimensional resonator parameters. Resulting design criteria are discussed. Realization of groups of interconnected resonators, all as part of a single quartz wafer, introduces a set of problems: first, obtaining accurately located, adherent, low-loss electrode patterns; second, measuring the response of individual resonators without interference from electrical coupling with other resonators; and third, tuning individual resonators by adjusting electrode thickness. Workable though not totally satisfactory solutions to these problems appear to be: gold over aluminum electrodes with photo-etching, shielded spring-clip measuring fixtures and liquid damping of other resonators as required, and spot electroplating using a standard gold cyanide plating solution.

AD-426 938 Div. 8
CFSTI Prices: HC$3.00

General Electric Co., Syracuse, N. Y. Heavy Military Electronics Dept.
SOLID STATE MICROELECTRONIC SYSTEMS.
Final rept. for 20 Aug 62-19 Aug 63,
by G. Danielson, R. Marolf, and R. Warr. 19 Aug 63, 80p
Contract DA36 039AMC00020 Unclassified report

Descriptors: (*Microminiaturization (Electronics), Telegraph equipment), Reliability (Electronics), Telegraph systems, Bandpass filters, Digital systems, Maintenance, Weight, Crystal oscillators, Loss-pass filters, Capacitors, Amplifiers, Solid state physics.

A microelectronic version of the Telegraph Terminal TH-22(XC-3)/TG has been fabricated. A considerable reduction in volume, weight and power consumption has occurred. The microelectronic version requires no adjustments or tuning. A prototype bandpass filter, employing active filters in a digital filter configuration, has been constructed. The bandpass filter has characteristics similar to the bandpass portion of the F-316/U. Throw-away and Replacement policies have been studied for microelectronics. (Author)

AD-441 460 Div. 8
CFSTI Price: HC$1.00

Air Force Cambridge Research Labs., Bedford, Mass.
A MONOPOLE PHASED-ARRAY FEED FOR SPHERICAL REFLECTORS.
Instrumentation paper,
by W. G. Mavroides and L. S. Dorr. Apr 64, 18p
IP-37, AFCRL 64-291
Proj. 4600
N64 22611 Unclassified report

Descriptors: (*Radar reflectors, Spheres), (*Phased arrays, Antenna feeds), (*Antenna feeds, Phased arrays), Test methods, Reflectors, Tests, Phase control devices, Waveguides, Probes (Electromagnetic), Ultrahigh frequency.

A line source array has been designed and built to illuminate a spherical reflector 500 ft in diameter. The spherical aberration is corrected by controlling the phase along the line source by uniformly spaced cylindrical posts (periodic structure) and by varying the width of the waveguide along the source. The amplitude of the radiation from the line source is controlled by probe-coupled monopoles. Design, test procedure, and results at 2840 Mc are presented. (Author)

Patent 3,176,288 Div. 8

SYSTEM FOR EXTENDING THE RANGE OF A SEARCH RADAR.
Patent assigned to Navy,
by Theodore Wyatt. 30 Mar 65 Unclassified patent
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Radar antennas, Guided missile defense systems), (*Search radar, Radar antennas), (*Helicopters, Search radar), Ranges (Distance), Adaptive control systems, Electric cables, Antiaircraft defense system, Antiaircraft fire control systems, Antimissile defense systems, Drones, Patents.

The system is used for extending the range of land-based or shipboard radar guided missile systems. The system is shown associated with a guided missile ship. It enables detection of enemy missiles approaching from beyond the horizon. The use of a search radar is extended by the use of a robot helicopter powered and controlled through a tether cable. The helicopter carries an antenna in a radome.

Patent 3,176,301 Div. 8

PLURAL HORNS AT FOCUS OF PARABOLIC REFLECTOR WITH SHIELDS TO REDUCE SPILLOVER AND SIDE LOBES.
Patent assigned to Navy,
by Richard S. Wellons and Carey A. Evans. 30 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 0231, $0.25

Descriptors: (*Parabolic antennas, Electromagnetic shielding), (*Antenna feeds, Parabolic antennas), Antenna lobes, Control, Tracking, Ultrahigh frequency, Patents.

The metallic reflector is shaped generally in a paraboloid. The leading or forward portion is distorted from the parabolic shape and assumes a cylindrical configuration. The active element of the antenna is disposed in front of the reflector and in its focal plane. It is made up of four feed horns. A cylindrical metallic shield encloses the feed horns.

Patent 3,177,987 Div. 8, 1, 12

INTERMITTENTLY-LAPPED EXTENDIBLE BOOM.
Patent assigned to Navy,
by Frank H. Swaim. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Extendable structures, Dipole antennas), (*Dipole antennas, Extendable structures), Patents, Satellite antennas, Aircraft antennas, Guided missile antennas, Metal films, Pipes, Mechanical working, Heat treatment, Winding.

The extendable antenna device is for use on aircraft, missiles and space satellites. The antenna is collapsible within the satellite during launching. It is easily extendible when the satellite has entered its orbit. The antenna boom consists of a narrow, several feet in length, strip of beryllium copper. Notches and tabs interlock along the length of the strip. The strip is wound upon a storage spool in its flat condition.

PB-167 189 Div. 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
GUIDED EM MODES IN A PN JUNCTION DEPLETION LAYER,
by Alan H. Luther. 22 Jul 64, 28p NOLTR64-129
Task RREN04 010 212 1F008 21 02
AD 448 300
Unclassified report

Descriptors: (*Diodes (Semiconductor), Propagation), (*Electromagnetic waves, Diodes (Semiconductor)), Dielectrics, Sandwich construction, Dielectric properties, Equations, Frequency, Thickness, Space charges, Electrical conductance, Perturbation theory.

Recent advances in diode technology have paved the way for a new family of devices using guided electromagnetic wave propagation in pn junctions. These devices appear useful in the infrared spectrum as sources, modulators, or optical circuit elements. An understanding of the wave propagation is essential to device design and realization. This report deals with the general characteristics of this propagation, and works out the propagation characteristics of the guided modes existing in the diode space charge layer. The problem of guided electromagnetic wave modes in a three-layer dielectric sandwich is discussed. General solutions are found in terms of the dielectric constants, central layer width, and frequency. The solutions are valid for media with small loss tangents. These results are then applied to the electromagnetic wave modes guided along the depletion layer of a pn junction. (Author)

PB-167 197 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Cooley Electronics Lab., Univ. of Michigan, Ann Arbor.
STATISTICAL MEASUREMENTS OF DETECTION OF M ORTHOGONAL SIGNALS KNOWN EXCEPT FOR PHASE,
by D. W. Fife. Dec 60, 11p
Technical memo no. TM-81, 2899-40-T
Contract DA36 039sc78283, Projs. 3A99 06 001 01, 2899
AD 250 288
Unclassified report

See also AD-260 707.

Descriptors: (*Radio signals, Demodulation), (*Statistical analysis, Demodulation), Signal-to-noise ratio, Simulation, Radio receivers, Recording devices, Measurement.

The SIMulated Receiver And Recorder (SIMRAR) equipment of this laboratory has been used to make statistical measurements of detection of M orthogonal signals known except for phase and starting time. The possible starting times of the signals are overlapping. The results are compared to the theoretical detection performance for nonoverlapping signals. (Author)

9. Fluid Mechanics

AD-281 063 Div. 9
CFSTI Price: HC$1.00

Johns Hopkins Univ., Baltimore, Md.
MEASUREMENTS IN A TWO-DIMENSIONAL TURBULENT JET,
by Gunnar Heskestad. Apr 62, 22p
Contract AF49 638 248
AFOSR 2456
Unclassified report

Descriptors: (*Jets, Measurement), Turbulence, Two-dimensional flow, Velocity, Shear stresses, Reynolds number, Anemometers, Graphics.

Preliminary results of measurements on a two-dimensional turbulent jet are reported. The measurements were made with a constant temperature hot-wire set in a region far enough downstream to be approximately self-preserving. The results include the lateral distributions of mean streamwise velocity, together with r.m.s. components fluctuating velocities and Reynolds shear stress, in coordinates oriented along the streamlines and perpendicular to them. The results are preliminary to the extent of needing corrections for nonlinear effects of the hot-wire. (Author)

AD-282 273 Div. 9
CFSTI Price: HC$5.00

IIT Research Inst., Chicago, Ill.
EXPERIMENTAL AND THEORETICAL STUDIES OF JET NOISE PHENOMENA.
Final rept. for Mar 61-Feb 62,
by W. C. Sperry, R. Kamo, and A. Peter. Jun 62, 177p
Rept. no. 1190
Contract AF33 616 6976, Proj. 3066, Task 306601
ASD TDR-62-303 Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Jet engine noise, Scientific research), (*Exhaust nozzles, Noise generators), Anechoic chambers, Annular nozzles, Aerodynamic slots, Convergent divergent nozzles, Gas flow, Supersonic flow, Subsonic flow, Turbulence, Theory, Mathematical analysis, Statistical analysis, Sound generators, Temperature, Tests.

Over-all sound pressure levels were measured in an anechoic room for noise generated by cold air flow through more than twenty different nozzle configurations including converging, converging-diverging, slot, and annular types, the latter with and without center core flow. The results are examined in terms of over-all acoustic power and directivity versus mass flow and compared with various eighth power relations. The acoustic performance of most nozzles was similar in the subsonic region. However, certain annular type nozzles exhibited a marked superiority in the supersonic region. Theoretical discussions are presented concerning the generation of sound and the relationship between various turbulence and statistical theories. A modified mixing length theory is developed showing its application to turbulence generation as well as its influence on the general forcing function equation. Temperature effects are included. Empirical data is given pertaining to the correlation of jet noise from circular and annular nozzles. (Author)

AD-285 651 Div. 9
CFSTI Price: HC$3.00

RAND Corp., Santa Monica, Calif.
THE TURBULENT BOUNDARY LAYER IN A COMPRESSIBLE FLUID,
by D. E. Coles. Sep 62, 84p Rept. no. R-403-PR
Contract AF49 638 700 Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Compressible flow, Turbulent boundary layer), (*Turbulent boundary layer, Compressible flow), Transformations (Mathematics), Partial differential, Turbulence.

A point of departure is provided for boundary-layer specialists interested in effects of heat and mass transfer in turbulent boundary layers, especially in high-speed flight. Several physical and mathematical aspects of the problem of dealing with compressible boundary-layer flows by transforming them to equivalent incompressible flows are discussed. The method was never fully exploited for the case of turbulent flow. The first object is to develop a transformation that reduces the boundary-layer equations for compressible two-dimensional mean turbulent motion to incompressible form. The second object is to apply this transformation to the special case of the adiabatic turbulent boundary layer on a smooth wall. The present transformation represents at every stage a genuine kinematic and dynamic correspondence between two real flows, both of which are capable of being observed experimentally. Since the mean pressure and mean velocity can then be measured in either flow, the mean acceleration of the fluid can be determined, and the shearing stress can be accurately defined as the stress that is necessary to account for this acceleration. This formulation leads to a general transformation valid for laminar or turbulent flow in wakes and boundary layers, without regard to the state or energy equations or the viscosity law for the compressible fluid, and without regard to the boundary conditions on surface pressure or temperature in the event that a surface is involved. (Author)

AD-442 657 Div. 9
CFSTI Price: HC$4.00

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
PROPAGATION OF AN INITIAL DENSITY DISCONTINUITY,
by George Bienkowski. 15 May 64, 104p
Memorandum no. M-70
Contract DA31 124ARO D33
N64 27571

Unclassified report

Rept. on Hypersonic Research Proj. a part of Proj. DEFENDER.

Descriptors: (*Hypersonic flow, Gas flow), (*Gas flow, One-dimensional flow), Transport properties, Molecular properties, Density, Perturbation theory, Propagation, Velocity.

The propagation of an initial one-dimensional density discontinuity is studied. The solution for times much shorter than the mean free time between collisions (i.e. collisionless), and the solution for times much longer than the mean free time (i.e. Euler) are functions of the same similarity variable x/t. They differ only in the details of the profiles. A method for evaluating the first effect of collisions is developed as an expansion in time with coefficients as functions of the similarity variable. The solutions are obtained in detail for both the Krook collision model and the exact collision integral for inverse fifth-power repulsion. The Krook model is found to agree qualitatively with the 'exact' solution except in the region of eventual shock formation for high initial density ratios. In that region the Krook model tends to overestimate the effect of collisions. The first effect of collisions in general alters the free molecular solution in the proper direction towards the Navier-Stokes result. The 'first collision' solution appears to be valid up to times of the order of a mean free time between collisions on the high pressure side. Analysis of the long time solution through the Navier-Stokes equations under the assumption of no interaction between the shock and contact surface indicates that the Euler solution is not relevant until times of the order of 1,000 mean free times.

OTR-112 Div. 9, 30
CFSTI Price: HC$0.50

National Bureau of Standards, Washington, D. C. Inst. for Applied Technology.
FLUID AMPLIFICATION.
May 65, 25p

Unclassified report

Research supported by National Bureau of Standards, Washington, D. C., Inst. of Applied Technology.

Descriptors: (*Fluid flow, Amplifiers), (*Amplifiers, Fluid flow), (*Control systems, Fluid flow), Reliability, Coanda effect, Reviews, Abstracting, Pneumatic systems, Jets, Bibliography, Stability, Fluid mechanics, Computer logic, Digital systems, Seromechanisms, Theory.

Significant reports covering the period since 1960 were selected for this study with reference to earlier works. Recent Government-sponsored research has shown that fluid amplification is a feasible technique that shows promise, particularly for operation in extreme environments such as high radiation flux, high temperatures, and shock vibrations. Devices based on this concept possess high potential reliability. Fluid amplifiers will most likely be seen first in military applications where the potential advantages outweigh the development costs. To date, some computer devices have been developed based on the Coanda effect and some systems have been devised by combining these devices. (Author)

PB-166 949 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Virginia Univ., Charlottesville.
THE VISCOSITY OF MODERATELY DENSE GASES,
by Shoon Kyung Kim and John Ross. Sep 64, 32p
Technical rept. no. BRN-13-P
Contract Nonr362300, Proj. NR098 038
AD 448 076; N64 32979

Unclassified report

Rept. on Proj. SQUID.
Subcontracted to Brown Univ., Providence, R. I.

Descriptors: (*Gases, Viscosity), Jet propulsion, Experimental data, Theory, Density, Transport properties, Mixtures, Series, Mathematical analysis, Statistical analysis.

PB-167 192 Div. 9
CFSTI Prices: HC$3.00 MF$0.75

General Dynamics/Pomona, Calif.
TURBULENT FLOW AND HEAT TRANSFER NEAR SURFACE PROTURBERANCES.
Technical memo.,
by H. Dershin. Dec 63, 91p TM-349-127, CR-3
Contract NOrd16840
AD 448 755; N64 32458

Unclassified report

Prepared for Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.

Descriptors: (*Supersonic flow, Turbulence), (*Heat transfer, Aerodynamic characteristics), Surface properties, Two-dimensional flow, Separation, Adiabatic gas flow, Boundary layer, Perturbation theory, Aerodynamic heating, Separation, Pressure, Distribution, Equations.

The problem of two-dimensional, supersonic, turbulent flow on a plate upstream of a surface protuberance is considered within the framework of the Crocco-Lees mixing theory. Engineering methods are presented which can be used to calculate the pressure distribution upstream of a step which extends beyond an adiabatic boundary layer. These are based on newly derived equations for the mixing rate coefficients very close to the point of separation and rely on empirical variations of this parameter elsewhere. Heat transfer is considered at the point of turbulent separation. Equations are derived which successfully predict the perturbations over ordinary flat plate heat transfer due to separation. (Author)

PB-167 297 Div. 9, 12
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
HEAT-TRANSFER MEASUREMENTS ON A FLAT PLATE IN THE NOL HYPERSONIC SHOCK TUNNEL NO. 1,
by D. F. Gates, B. J. Noonan, and L. Brekka.
8 Oct 64, 29p Ballistics research rept. no. BRR-47, NOLTR-61-91
AD 448 592
Unclassified report

Descriptors: (*Heat transfer, Atmosphere entry), (*Reentry vehicles, Aerodynamic heating), Shock tubes, Flat plate models, Boundary layer, Hypersonic flow, Tests, Simulation, Turbulence.

Heat-transfer measurements were made on a smooth flat plate at Mach numbers 8 and 10, with T sub w/T sub aw ratios from 0.09 to 0.150, and unit Reynolds numbers up to 38x106/foot. The results were compared to the laminar theories of Van Driest and Cohen-Reshotko and to the turbulent predictions of Van Driest and Winkler-Cha. The laminar data showed good agreement with both theories whereas the turbulent data were in agreement only with the Winkler-Cha prediction. Test conditions are generated by a shock tunnel utilizing a free jet expansion and determined by assuming isentropic expansion from measured supply conditions to an experimentally determined dynamic pressure. (Author)

SB-541 Div. 9

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
FLUID AMPLIFIERS.
Price list, selective bibliography of Government research repts. and translations through Feb 65.
Feb 65, 7p Unclassified report

Available free from the Clearinghouse.

Descriptors: (*Amplifiers, Fluid flow), (*Bibliographies, Amplifiers), Fluids, Control systems, Jets, Coanda effect, Timing devices, Computer logic, Digital systems.

Lists 32 domestic references on fluid amplifiers added to the CFSTI collection through February 1965. Includes research on the following types of fluid amplifiers: bi-stable digital, three-stage digital, two-stage, proportional vortex, fluid-jet and cast-epoxy; design and development; application to controlled medical devices and a machine tool. (Author)

10. Fuels and Combustion

Patent 3,175,877 Div. 10, 4

LITHIUM DECABORANE AMMONIA ADDUCTS PREPARATION.
Patent assigned to Air Force,
by Theodore L. Heying. 30 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Solid rocket propellants, Preparation), (*Lithium compounds, Decaboranes), (*Decaboranes, Complex compounds), (*Ammonia, Complex compounds), Synthesis (Chemistry), Solid rocket oxidizers, Solid rocket propellant binders, Patents.

The lithium decaborane ammonia adduct can be incorporated with oxidizers to yield a solid propellant for rocket power plants. It is made by reacting lithium metal and decaborane at from -60 to plus 40 degrees C. while the reactants are dissolved in liquid ammonia. The product is recovered from the reaction mixture.

11. Ground Transportation Equipment

No entries

12. Guided Missiles

Patent 3,174,336 Div. 12, 31

FLUID FLOW INDICATOR.
Patent assigned to Navy,
by William E. Zrubek. 23 Mr 65,
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Flowmeters, Ocean currents), (*Guided missile launchers, Flowmeters), Transducers, Circuits, Resistance (Electrical), Moments, Fluid flow, Patents.

The indicator is utilized to determine relative velocity and direction of flow to water with respect to a submarine from which a missile is to be launched. A fixed arrangement of pressure-responsive transducers is utilized. The transducers are connected in an electrical network.

Patent 3,174,706 Div. 12

SEPARATION DEVICE.
Patent assigned to Army,
by Hermann R. Wagner. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Satellites (Artificial), Release mechanisms), Pneumatic devices, Launch vehicles (Aerospace), Patents, Separation, Staging.

The separation device retains a satellite and a vehicle for the satellite in axial engagement. The device is responsive to an electrical signal to separate the two components. Gas pressure generated by squibs is used in the separation of the two components. The satellite and vehicle include flanges and the separation device includes rods with pistons in the cylinders. The rods engage with the flanges to secure the two components together.

Patent 3,175,789 Div. 12

LANDING PAD ASSEMBLY FOR AEROSPACE VEHICLES.
Patent assigned to NASA,
by Josef F. Blumrich. 30 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Landing gear, Lunar surface vehicles), (*Lunar surface vehicles, Landing gear), Spacecraft, Patents.

The landing gear forms part of a space vehicle designed for a lunar landing. The landing pad itself is in the form of a hollow spherical curved pad having radially collapsible ribs or spokes formed in it. The ribs absorb the shock of landing by collapsing or crumpling. A ball joint is used to secure the pad to the landing gear system.

13. Installations and Construction

Patent 3,177,933 Div. 13, 12

THERMAL SWITCH.
Patent assigned to NASA,
by John M. Bozajian. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Temperature control, Spacecraft), (*Heat exchangers, Temperature control), (*Temperature sensitive elements, Spacecraft), Patents, Heat transfer, Thermal conductivity, Surfaces, Temperature sensitive elements, Space environmental conditions.

The thermal switch is suited to the thermal control of spacecraft components to maintain constant temperature conditions irrespective of cyclic solar radiation environments. A pair of thermal contacts are provided in heat exchange relation with a pair of high conductivity surfaces thermally insulated from each other. A bi-metallic member is used to mount one of the contacts for movement into and out of engagement with the other contact in response to temperature variation of the first surface above and below a predetermined temperature.

Patent 3,177,935 Div. 13, 27, 1

COOLING TUBE STRUCTURE.
Patent assigned to Air Force,
by Irwin E. Rosman. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Pipes, Cooling), (*Structural parts, Cooling), (*Cooling, Structural parts), Brazing, Airframes, Engine structures, Rocket motors, Ramjet engines, Hypersonic flow, Heat transfer, Surfaces, Cylindrical bodies, Patents.

The tubular structure may be used in rocket thrust chambers, ramjet components and airframe structure. The cooling structure includes a plurality of tubular members joined together in a cylindrical arrangement. The tubular members are joined by brazing. The cylindrical device has one smooth wall surface.

14. Materials (Non-Metallic)

AD-242 398 Div. 14
CFSTI Price: HC$1.00

RAND Corp., Santa Monica, Calif.
THE EFFECT OF FILAMENTARY MATERIALS ON PRESSURE-VESSEL DESIGN,
by George A. Hoffman. 19 Apr 60, 25p Unclassified report
Rept. no. P-1974
Rept. prepared for presentation at the International Astronautical Congress (11th), Stockholm, Sweden, 15-20 Aug 60.
Available copy will not permit fully legible reproduction.

Descriptors: (*Filament wound construction, Composite materials), (*Composite materials, Filament wound construction), (*Pressure vessels, Filament wound construction), Filaments, Glass textiles, Single crystals, Stresses, Mathematical analysis, Structures, Mechanical properties, Tensile properties.

The use of fiber composite materials in pressure vessels is discussed. Because a fiber composite is a highly orthotropic material, an analysis is presented to show that many useful vessel shapes can be derived which are uniformly stressed and thus highly efficient. Consideration is given to non-netting winding patterns and shapes without cross-over of filaments and with a minimum build up near the axis. A mathematical description is presented for the principal stresses in an element bounded by sections of meridional curves and circumferential circles. Salient mechanical properties of whiskers are reviewed.

AD-454 927 Div. 14, 1
CFSTI Price: HC$1.00

Naval Air Engineering Center, Philadelphia, Pa.
Aeronautical Materials Lab.

THE MODIFICATION OF IN-FLIGHT RAIN REPELLENTS AND SPECIFICATION REQUIREMENTS THEREFOR,
by W. E. Mackenzie. 7 Dec 64, 13p
Rept. no. NAEC-AML-2094
Task RRMA04 013 200 1R001 02 01
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Raindrops, Moistureproofing), (*Windshields, Films), (*Moistureproofing, Aircraft), Polymers, Flight, Test methods, Specifications, Silicone plastics, Fluids, Surface-active substances.

The development of rain repellents for in-flight use is described. Specification requirements and test methods are given for a rain repellent material to be applied in flight in rain conditions.

Patent 3,174,933 Div. 14

LUBRICANTS, METAL-WORKING AGENTS, AND HYDRALIC LIQUIDS.
Patent assigned to Farbenfabriken Bayer Akt., Leverkusen, (Germany).
by Alfons Klein and Hans Werner Kauczor. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricants, Thiazoles), (*Cutting fluids, Thiazoles), (*Hydraulic fluids, Thiazoles), (*Thiazoles, Lubricants), Thiols, Alcohols, Chlorides, Nitrates, Esters, Ethylene oxide, Halohydrins, Glycols, Polymers.

Minor amounts of hydroxyalkylated mercaptobenzthiazoles and their hydrophilic organic solvents in water possess high lubricity in hydrodynamics and maximum friction fields. A reaction product of 2-mercaptobenzthiazole and ethylene or propylene oxide and/or epichlorohydrin in molecular ratios of 1 to at least 5 is combined with ethylene glycol. The hydroxyalkylated mercaptan is 0.5 percent of the solvent by weight. From 0.5 to 3 percent by weight of the composition in water is transparent and will not lead to demixing when used in metal cutting operations. The compound may be used in an alkaline or acidic medium, and will not react with the calcuim in hard water.

Patent 3,174,936 Div. 14

LITHIUM PERCHLORATE OXYGEN CANDLE.
Patent assigned to Navy,
by Paul R. Gustafson and Roman R. Miller.
23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lithium compounds, Perchlorates), (*Oxygen equipment, Materials), Boron, Iron, Barium compounds, Peroxides, Fibers, Copper, Asbestos, Chlorides, Manufacturing methods, Patents.

The invention involves a composition capable of yielding oxygen on combustion and a method for its manufacture. The candles may be composed of 85-93% lithium perchlorate, 0-8% barium peroxide, 1-22% iron powder, 1.5-3% boron, and 3-4% copper fibers, asbestos fibers or other inert filler. A dehydrating agent, lithium chloride, is formed as a combustion product.

Patent 3,175,928 Div. 14

ANHYDROUS HCl MODIFICATION OF FLOUR.
Patent assigned to Agriculture,
by Earl B. Lancaster and Edward L. Griffin.
30 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Paper, Additives), (*Flour, Processing), Wheat, Hydrochloric acid, Ammonia, Patents.

Wheat flour is acid-modified to provide a product that pastes readily in water to form an excellent sizing agent for paper. The wheat flour to be treated has a critical moisture content. It is treated with 1.2 to 1.6 g. of anhydrous hydrogen chloride gas per 100 g. of the flour (dry basis). A ribbon blender is used. After treatment for 40 to 100 minutes a neutralizing amount of ammonia gas is added and the mixing is continued to effect neutralization.

Patent 3,175,971 Div. 14

LUBRICATING OILS CONTAINING ORGANO-MOLYBDENUM TRICARBONYL COMPOUNDS.
Patent assigned to Standard Oil Co., Chicago, Ill.,
by Edwin L. De Young. 30 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricants, Antioxidants), (*Antioxidants, Molybdenum compounds), (*Molybdenum compounds, Metalorganic compounds), (*Metalorganic compounds, Lubricant additives), Complex compounds, Aromatic compounds, Aliphatic compounds, Mineral oils, Calcium compounds, Sulfonates, Phosphorus compounds, Sulfides, Polyethylene plastics, Patents.

A mineral lubricating oil for internal combustion engines utilizes hydrocarbyl substituted benzene molybdenum tricarbonyl co-ordination compounds to inhibit the corrosion of metal alloys of the type used in bearings and other parts, and particularly silver alloys. The benzene of the composition has at least one aliphatic substituent containing 8 to 18 carbon atoms. From 0.2 to 0.5 percent by weight of the compound is employed in a lubricating oil containing from 0.01 to 5 percent by weight of a neutralized phosphorus sulfide-polybutene detergent.

Patent 3,175,973 Div. 14

ANTI-WEAR LUBRICANT COMPOSITION.
Patent assigned to Pure Oil Co., Chicago, Ill.,
by Allen F. Millikan and Gifford W. Crosby. 30 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Organic phosphorus compounds), (*Organic phosphorus compounds, Lubricant additives), (*Organic sulfur compounds, Lubricant additives), Oils, Esters, Alcohols, Wear resistance, Patents.

Lubricating oils containing from 0.005 to 1.0 weight percent of phosphorus in an arylphosphorothioate neutral ester composition having a sulfur-to-phosphorus ratio in

excess of 2.0 have good antiwear properties. The aryl-phosphorothioate neutral ester compositions are reaction products produced by reaction of benzyl alcohol, substituted benzyl alcohol, or compounds which react to produce substituted benzyl alcohol with phosphorus pentasulfide or with dialkyl or diaryl esters of phosphorodithioic acid. The phosphorothioate ester composition has an acid equivalent per atom of phosphorus of about 1 and a sulfur-to-phosphorus atomic ratio of 3-4/1, and produced by reaction of phosphorus pentasulfide, a lower alkanal and a phenol in a mol ratio of 1:4:4 at temperatures ranging from 20 to 160C.

Patent 3,175,974 Div. 14, 4

MINERAL LUBRICATING OIL COMPOSITIONS.
Patent assigned to Pure Oil Co., Chicago, Ill.,
by Charanjit Rai and John B. Braunwarth. 30 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Organic sulfur compounds), (*Antioxidants, Lubricant additives), (*Corrosion inhibition, Lubricant additives), (*Thiazoles, Lubricant additives), (*Sulfides, Lubricant additives), Lubricants, Mineral oils, S-heterocyclic compounds, Polycyclic compounds, Synthesis (Chemistry), Patents.

Mineral lubricating oil compositions containing chemical compounds characterized as bis(2-benzothiazolyl) dialkyl sulfides have good oxidation and corrosion inhibiting properties. The mineral lubricating oil contains from 0.1 to 3.0 weight percent of an antioxidant of the general formula bis(2-benzothiazolyl)dialkyl sulfide. The antioxidant is preferably either 2,2'-bis(2-benzothiazolyl) diethyl sulfide or 3,3'-bis(2-benzothiazolyl)dipropyl sulfide.

Patent 3,177,144 Div. 14

LUBRICATING COMPOSITION.
Patent assigned to Shell Oil Co., New York, N. Y.
by Thomas E. Reamer and John E. Weigel. 6 Apr 65,
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Lubricants, Preparation), (*Cutting fluids, Preparation), (*Phosphonic acids, Lubricant additives), Alkali metal compounds, Potassium compounds, Sodium compounds, Lithium compounds, Chlorine compounds, Amines, Fatty acid esters, Ethylene oxides, Epoxy plastics, Patents.

An aqueous pressure lubricant is useful in cutting, drilling, reaming, grinding and other machining and forming operations. The lubricant contains from 0.5 to 15 percent by weight of both a water-soluble dialkali metal salt of chloro C1-4 alkyk phosphonic acid and an alkanolamine salt of a C12-20 unsaturated fatty acid. The lubricant also contains a major amount of water and from 0.5 to 15 percent by weight of both free alkanolamine and water-soluble ethylene and propylene oxides having a molecular weight of from 250 to 1500.

PB-167 021 Div. 14, 25
CFSTI Prices: HC$3.00 MF$0.50

Aerojet-General Corp., Azusa, Calif.

NON-EVACUATED CRYOGENIC SUPERINSULATION.
Quarterly progress rept. no. 1, 14 Jun 15 Sep 1963,
by C. L. Johnson and D. J. Hollweger. Oct 63, 52p
Rept. no. 0782-01-1
Contract AF33 657 11200
AD 249 089
Unclassified report

Descriptors: (*Cryogenics, Thermal insulation), (*Thermal insulation, Cryogenics), (*Reviews, Cryogenics), Instrumentation, Thermal conductivity, Heat transfer, Particle size, Gases.

The results of a survey of the technical literature for information concerning the behavior of porous insulating media suitable for cryogenic service are presented with special attention given to heat transfer characteristics in the transitional pressure range between free-molecular and viscous flow. Conditions governing the design of non-evacuated, high-efficiency, porous cryogenic insulation are discussed and a hypothetical model is advanced as an aid in predicting thermal conductivities of potential insulating materials. The concept of agglomeration of sub-micron particles in the 80A size range and its effect upon insulation values is discussed. Several suggestions are made for substantially decreasing gaseous conductivity by control of the interstitial gas pressure. (Author)

PB-167 179 Div. 14
CFSTI Prices: HC$2.00 MF$0.50

Meteorological Satellite Lab., Weather Bureau,
Washington, D. C.
SPECULAR SPECTRAL REFLECTANCE OF PAINTS FROM 0.4 TO 40.0 MICRONS,
by W. Y. Ramsey. Apr 64, 36p Rept. no. MSL-31
Unclassified report

Descriptors: (*Infrared equipment, Paints), (*Paints, Infrared equipment), (*Reflection, Paints), Measurement, Spectrophotometers, Infrared spectrophotometers, Surface properties, Thickness.

Measurements were performed in order to allow qualitative comparison of the spectral characteristics of various paints in support of their use in infrared instruments. The results have allowed selection of paints for use in infrared instruments and are reported here so that they can be used by others for similar purposes. The actual absolute reflectance values reported herein are qualitative because of the possible effects of scattering which have not been determined. (Author)

PB-167 190 Div. 14, 25
CFSTI Prices: HC$3.00 MF$0.75

Massachusetts Inst. of Tech., Cambridge.
STUDY OF THE PHENOMENON OF COLD-DRAWING (PLASTIC YIELD) IN HIGH POLYMERS.
Technical rept.,
by R. D. Andrews, Jr. and W. Whitney. Aug 64, 70p
Contract DA19 129AMC100N, Proj. 1K024401A113
C/OM 3; AD 447 223
Unclassified report

Descriptors: (*Polymers, Mechanical properties), (*Plastics, Fracture (Mechanics)), Acrylic resins, Styrene plastics, Tensile properties, Compressive properties, Plasticity, Deformation, Stresses, Strain (Mechanics), Creep, Fibers (Synthetic), Cold working, Sheets.

An exploratory study of the phenomena of cold-drawing

and plastic yield in high polymers is described in which the stress-strain properties and the geometry of yielding were investigated for two glassy amorphous polymers: polystyrene and polymethyl methacrylate. Stress-strain properties and cold-drawing behavior of polystyrene (PS) were obtained in tensile tests at constant strain rate as a function of temperature and degree of preorientation. The drawing of polystyrene in dead-load tensile creep was also investigated. The properties of polymethyl methacrylate (PMMA) were investigated in tensile tests at constant strain rate as a function of temperature, strain rate, molecular weight, and cross-linking. Compression tests were run on both polymers to study the effect of a different stress field; effects of temperature and of density changes produced by thermal history were also examined. Throughout these experiments, the exact deformation and/or fracture mode was noted. General conclusions and recommendations for future studies in this area are presented. (Author)

PB-167 254 Div. 14, 25
CFSTI Prices: HC$2.00 MF$0.50

Texas Instruments, Inc., Dallas.
NEW HIGH TEMPERATURE INFRARED TRANSMITTING GLASSES.
Semiannual technical summary rept. no. 2, 1 May-31 Oct 63,
by A. Ray Hilton, Charlie E. Jones, and Maurice J. Brau. 31 Oct 63, 35p Rept. no. TI-08-63-167
Contract Nonr381000 Unclassified report
AD 424 549

Presented at the National Meeting of IRIS(10th) Fort Monmouth, N. J. Oct 1, 1963.

Descriptors: (*Infrared optical materials, Optical glass), (*Infrared windows, Optical glass), (*Optical glass, Infrared windows), Infrared optical systems, High-temperature research, Glass, Heat-resistant glass, Airborne, Supersonic flight, Silicon, Antimony, Sulfur, Selenium, Tellurium, Germanium, Phosphorous, Arsenic, Absorption, Tin, Optical properties, Experimental data, Phase studies.

An investigation was made of three-component (ternary) non-oxide glasses made from elements from groups IVA, VA, and VIA as possible high temperature (500C) infrared window materials. Of particular importance are materials that can be used to take advantage of the atmospheric windows at 3 to 5 and 8 to 14 microns. Systems evaluated are the Ge-P-S, Ge-P-Se, and Ge-As-Te. The Ge-P-S and Ge-P-Se glasses are quite similar and show promise as moderate temperature (>400C) window materials for the 3 to 5 micron application. The Ge-As-Te glasses are of excellent optical quality (no appreciable absorption from 2 to 18 microns) but have low softening points (approximately 200C). Blends of individual glasses from different glass systems were prepared in an attempt to improve optical properties. The attempts were unsuccessful and indicate blending should be carried out one element at a time in small incremental amounts. The results of more careful characterization of the most promising glass compositions are given. (Author)

PB-167 256 Div. 14, 13, 29
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
PLASTIC COVERS FOR POTABLE WATER RESERVOIRS,
by C. A. Dittus. 27 Sep 63, 13p
Technical note N-535
Proj. Y F015 12 02 104
AD 420 067 Unclassified report

Report includes Appendices A, Synthetic Films Selected for Outdoor Exposure, and B, Properties and Design Data of Films Selected for Test.

Descriptors: (*Water supplies, Protective coverings), (*Protective coverings, Water supplies), (*Plastics, Protective coverings), Dams, Exposure, Contamination, Radioactive fallout, Laminated plastics, Polyethylene plastics, Polyvinyl chloride, Isocyanate plastics, Epoxy plastics, Adhesives, Grommets, Nylon, Cordage, Fibers (Synthetic), Maintenance, Water tanks, Films.

The report summarizes data and information gathered to date on plastic films which may be used as covers to protect potable water in storage reservoirs. Important properties and characteristics of the films selected for an outdoor exposure test are listed, together with a price comparison of the unreinforced films. The procedure, including the statistical design, for an outdoor evaluation of selected films is described, and technical information on cover construction and cover attachment techniques is presented. (Author)

15. Mathematics

AD-116 551 Div. 15
CFSTI Price: HC$5.00

RAND Corp., Santa Monica, Calif.
TABLE OF Q FUNCTIONS,
by J. I. Marcum. 1 Jan 50, 189p Rept. no. RM-339
Rept. on Proj. RAND. Unclassified report
Available copy will not permit fully legible reproduction.

Descriptors: (*Special functions (Mathematical), Tables).

AD-231 412 Div. 15, 26
CFSTI Prices: HC$2.00

California Univ., Los Angeles.
SOME PROBLEMS IN QUEUELING WITH DYNAMIC PRIORITIES,
Management Sciences Research Project,
by James R. Jackson. 30 Nov 59, 31p RR-62
Contract Nonr23302, Proj. NR047 003 Unclassified report
Available copy will not permit fully legible reproduction.

Descriptors: (*Queueing theory, Probability), Operations research, Model theory, Distribution theory, Management planning.

Mathematical and numerical results are presented for one-machine, discrete-time queueing models, subject to various queue disciplines. Interest is focused upon systems in which service order is governed by dynamic priorities, under which a customer's relative priority is upgraded with the passage of waiting time, so that the proportion of newcomers who can step in front of him becomes smaller and smaller as he waits. (Author)

PB-167 032 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.

CONVERSE FORMS OF THE HADAMARD PRODUCT THEOREM,
by R. C. Buck. 24 Oct 57, 9p
Technical summary rept. no. MRC-TSR-11
Contract DA11 022ORD2059
AD 160 672

Unclassified report

Descriptors: (*Algebra, Theory), Integrals, Polynomials.

PB-167 075 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
NEUTRIX CALCULUS III. GENERAL NEUTRIX CALCULUS,
by J. G. van der Corput. Mar 60, 24p
Technical summary rept. no. MRC-TSR-144
Contract DA11 022ORD2059
AD 234 800

Unclassified report

Descriptors: (*Groups (Mathematics), Distribution theory), (*Real variables, Groups (Mathematics)), Differential equations, Operators (Mathematics).

General neutrix calculus treats the distributions of arbitrary order. Introduced into this theory are the notions of addition, substraction, multiplication, convergent series, limit, derivative, Fourier and Laplace transform and so on.

PB-167 076 Div. 15
CFSTI Prices: HC$3.00 MF$0.75

Mathematics Research Center, Univ. of Wisconsin, Madison.
NEUTRIX CALCULUS II: SPECIAL NEUTRIX CALCULUS,
by J. G. van der Corput. Aug 60, 63p
Technical summary rept. no. MRC-TSR-143
Contract DA11 022ORD2059
AD 243 054

Unclassified report

Descriptors: (*Groups (Mathematics), Distribution theory), (*Real variables, Groups (Mathematics)), Series.

Special neutrix calculus is defined as the theory of distributions of order zero, i.e., distributions which can be generated by constant. The behavior of these distributions is determined for a number of neutrices. This theory is shown to give as a special case the 'finite part' of an integral introduced by hadamard.

PB-167 077 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
NEUTRIX CALCULUS I. NEUTRICES AND DISTRIBUTIONS,
by J. G. van der Corput. Mar 60, 21p
Technical summary rept. no. MRC-TSR-142
Contract DA11 022ORD2059
AD 234 855

Unclassified report

Descriptors: (*Groups (Mathematics), Distribution theory), (*Real variables, Groups (Mathematics)), Series.

A class formed by negligible functions is called a neutrix. Neutrix calculus is defined as the theory of distributions. A great number of neutrices is constructed which can be used in the theory of neutrix limits.

PB-167 089 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
THE FOURIER TRANSFORM OF THE CONVOLUTION OF THE ABSOLUTE VALUE OF X TO THE (a-n)th POWER * g,
by K. T. Smith. Aug 60, 12p
Technical summary rept. no. MRC-TSR-203
Contract DA11 022ORD2059
AD 250 694

Unclassified report

Descriptors: (*Integral transforms, Fourier analysis), (*Fourier analysis, Integral transforms), Potential theory, Distribution theory, Integral equations.

IF g is a function in L-squared and the integral with respect to y of (1 + the absolute value of y) to the (a-n)th power (the absolute value of g(y)) is finite, then it is shown that the Fourier transform of (R * g) = (the absolute value of z to the -ath power) (the Fourier transform of g), provided that either side belongs to L-squared R = the M. Riesz kernel of order a.

PB-167 090 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
SINGULAR PERTURBATIONS OF EIGENVALUE PROBLEMS,
by W. A. Harris, Jr. Oct 60, 32p
Technical summary rept. no. MRC-TSR-202
Contract DA11 022ORD2059
AD 251 406

Unclassified report

Descriptors: (*Matrix algebra, Theory), Differential equations, Boundary value problems, Perturbation theory, Series.

It is shown under suitable restrictions that, corresponding to each simple eigenvalue L sub 0 of the degenerate (or unperturbed) eigenvalue problem, there exists a uniquely determined eigenvalue of the complete eigenvalue problem L(a), which has an asymptotic expansion of the form. L(a) = L sub 0 + L sub 1/a + ... An eigenvector y(t, a) corresponding to L(a) may be determined so that y(t, a) = y sub 0 (t) + 1/a y sub 1 (t) + ... , on the open interval a < t < b and uniformly on any closed subinterval, where y sub 0 is an eigenvector corresponding to L sub 0 for the degenerate problem. It is shown that for a class of self-adjoint problems this procedure characterizes the asymptotic behavior of all the eigenvalues of the complete problem.

PB-167 354 Div. 15, 9
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ANOTHER COMPUTATIONAL APPROACH TO A MATHEMATICAL MODEL OF TURBULENCE,
by S. P. Azen, R. Bellman, and J. M. Richardson.
Jan 64, 17p Rept. no. RM-3918-ARPA
Contract SD79, ARPA Order 189 61
AD 430 612

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Turbulence, Mathematical models), (*Mathematical models, Turbulence), Partial differential equations, Series, Numerical methods and procedures.

The nonlinearity of the equations of turbulence forces the mathematician to study approximation techniques, such as model equations which exhibit many of the characteristics of the realistic equations. In this series, the authors investigate computational methods to the solution of the model equation of Burgers. In the present Memorandum the application of a difference algorithm is studied. Numerical results obtained from a FORTRAN program are given.

Available copy will not permit fully legible reproduction.

Descriptors: (*Genetics, Model theory), (*Correlation techniques, Genetics), Statistical functions.

The correlation coefficient between members of any two colonies is analyzed out of an infinite ensemble of colonies. It is assumed that each colony has the same number of members, that migration takes place between the different colonies, and that there is a constant rate of mutation in each colony. An explicit formula is derived for the correlation function and the long distance form of this function is derived. It is shown that under rather weak restrictions on the pattern of migration the asymptotic form of the correlation function is characteristic of the dimension of the model. (Author)

16. Medical Sciences

AD-400 345 Div. 16
CFSTI Price: HC$2.00

Miami Univ., Coral Gables, Fla., School of Medicine.
CHRONIC EXPOSURE OF DOGS TO MICROWAVE RADIATION OF 24,000 MEGACYCLES AND A POWER DENSITY OF 20 mw/cm2.
Technical note,
by William B. Deichmann, Ernesto Bernal, Frank Stephens, and Karin Landeen. May 63, 31p
Proj. 5545
RADC TDR-62-604 Unclassified report

Presented before an AD Hoc Committee on Microwave Radiation, Office of the Surgeon General, Department of the Air Force, Washington, D. C., on October 31, 1961.

Descriptors: (*Radiobiology, Microwaves), (*Microwaves, Exposure), (*Dogs, Radiobiology), Cardiovascular system, Hemopoietic system, Hematology, Blood counts, Blood chemistry, Reproductive system, Pregnancy, Body temperature, Body weight, Eye, Electromagnetic waves, Physiology.

Two female beagle dogs were exposed to nearly total body radiation of 24,000 mc. Power density was kept constant at 20 mw/sq cm. The half-power diameter was approximately 20 cm. Over a period of 20 months dog D-135 was exposed for a total of 2631 hours (6.7 hr/day on 5 days of the week). Dog D-138 was exposed for a total of 3970 hours (16.5 hrs/day on 4 days of the week). The following observations were made. Throughout the experiment, the dogs showed no signs of radiation effects. Rectal temperatures, blood volume, hematocrit, hemoglobin, erythrocytes, total and differential leukocytes, blood cholesterol, and protein bound iodine values showed no significant changes from normal. No eye abnormalities were produced. Both dogs reproduced normally. The gain in body weight was subnormal in both animals. (Author)

AD-411 876 Div. 16, 15
CFSTI Price: HC$0.50

Institute for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park.
A MATHEMATICAL ANALYSIS OF THE STEPPING STONE MODEL OF GENETIC CORRELATION,
by George H. Weiss and Motoo M. Kimura.
Jun 63, 36p Technical note no. BN-322
Contract Nonr59517 Unclassified report

AD-425 114 Div. 16
CFSTI Price: HC$3.00

Worcester Foundation for Experimental Biology, Shrewsbury, Mass.
THE METABOLISM OF HORMONAL STEROIDS AND OF EPINEPHRINE BY IMMATURE CHIMPANZEES,
by Donald S. Layne, Louise P. Romanoff, Enrico Forchielli, Oscar Resnick, and Rashad Y. Kirdani.
Nov 63, 70p
Contract AF29 600 3336
ARL TDR-63-25 Unclassified report

Descriptors: (*Steroids, Metabolism), (*Epinephrine, Metabolism), (*Metabolism, Hormones), Tracer studies, Labeled substances, Radioactive isotopes, Corticosteroid agents, Progesterone, Testosterone, Cardiovascular system, Excretion, Urine, Secretion, Chimpanzees, Humans.

Results are reported on the metabolism of tracer doses of adrenocortical and gonadal steroid hormones by ten immature chimpanzees. Values for the daily excretion of major metabolites of these hormones have been obtained, and where possible the endogenous secretion rate of the steroids in the chimpanzees has been estimated by isotope dilution. Data are reported on the metabolism of epinephrine labeled at two different sites in the molecule, and observations and comment are provided on selected cardiovascular effects of epinephrine infusion. The results on both the steroids and epinephrine have been compared to those obtained by similar methods in human subjects, and some conclusions have been drawn on the apparent suitability of the chimpanzee as a prototype for man in biological studies. (Author)

LF-20 Div. 16
CFSTI Prices: HC$0.50 MF$0.50

Lovelace Foundation For Medical Education and Research, Albuquerque, N. Mex.
ULTRAMICRO METHODS IN BIOCHEMISTRY. V. A COMPARISON OF THE ULTRAMICRO DETERMINATION OF PHOSPHORUS USING N-PHENYL-P-PHENYLENE-DIAMINE OR 1-AMINO-2-NAPHTHOL-4-SULFONIC ACID. VI. THE DETERMINATION OF SERUM ALKALINE PHOSPHATASE.
Technical progress rept.,
by E. Van Stewart and Bernard B. Longwell.
Dec 64, 22p
Contract AT(29-2)-1013
Unclassified report

Descriptors: (*Phosphorus, Chemical analysis), (*Phosphoric monoester hydrolases, Chemical analysis).

Patent 3,177,117 Div. 16

PROCESS FOR FREEZING BLOOD.
Patent assigned to Navy,
by Joseph E. Saunders. 6 Apr 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Blood, Freezing), Alcohols, Preservation, Anticoagulants, Patents.

The process of freezing blood containing an anticoagulant involves the addition to and mixing of the blood with mannitol (15 to 25 percent by weight) and rapid freezing of the mixture to about -196 degrees C.

PB-167 023 Div. 16
CFSTI Prices: HC$3.00 MF$0.75

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
EFFECTS OF MICROWAVES ON MANKIND.
Annual progress rept. no. 3, 1 Mar 59-31 Jul 60,
by H. P. Schwann, O. M. Salati, A. Anne, and M. Saito.
31 Jul 60, 79p
Contract AF41 657 129
RADC TN-60-158; AD 241 768

Unclassified report

Descriptors: (*Radiobiology, Microwaves), (*Microwaves, Exposure), Humans, Tissues (Biology), Absorption, Electromagnetic waves, Scattering, Voltage, Standing wave ratios, Anechoic chambers, Microwave equipment, Tables, Graphics.

Techniques were developed to measure the relative absorption cross section of mankind for microwaves by choice of appropriate phantoms. Measurements and calculations were carried out to determine the relative absorption cross sections of phantoms which simulate mankind and of spheres which are filled with solutions representative of tissue at microwave frequencies. The results of this work are presented. Some of the most important consequences are: (1) the relative absorption microwave cross section of man is near 50%, that is, biologically effective dosage is about half that measured by conventional instrumentation; and (2) the relative absorption cross section of small animals can vary between 10 and 1000%. Hence work with small animals does not necessarily pertain to mankind. (Author)

PB-167 171 Div. 16
CFSTI Prices: HC$2.00 MF$0.50

Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
THYROID WEIGHT WITH AGE (Le Poids de la Thyroide en Fonction de l'Age)
by Claudine Raulier-Fabry and Raymond Hammer.
Mar 65, 35p CEA-R-2724
Contract 003 61 10PSAF
EUR 2194f

Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Thyroid gland, Weight), (*Aging (Physiology), Thyroid gland), Statistical data.

A large number of data on thyroid weight of euthyroidal subjects have been collected from the literature in this study. The most probable average weight of the gland appears to be 20 g in the adult and 2 g in the newborn. A decrease in weight has been observed during the first year of life (1 g at 6 months) and only in the second year of life the initial birth weight is reached again. The weight curve may be considered as consisting of three straight lines: from 2 to 7, from 7 to 18 ans from 18 to 25 years, their sloped being respectively 0.6, 0.9 and 0.5 g/year. The variations in weight of the thyroid during adulthood are sufficiently small to consider it as having constant value between 25 and 55 years. The available information points to a negligible weight difference between the sexes. (Author)

TID-12616 Div. 16, 20
CFSTI Prices: HC$1.50 MF$1.00

Division of Biology and Medicine (AEC), Washington, D. C.
ATMOSPHERIC RADIOACTIVITY AND FALLOUT RESEARCH.
Second Revision.
Dec 64, 132p

Unclassified report

Descriptors: (*Radioactive fallout, Radiobiology), (*Radioactivity, Health physics).

17. Metallurgy

AD-43 989 Div. 17
CFSTI Price: HC$2.00

New York Univ., N. Y. School of Engineering and Science.
TITANIUM PHASE DIAGRAM STUDY.
Interim technical rept. no. 1, 1 Oct 53-31 Jan 54,
by P. Farrar, W. Kirk, and L. Stone. 31 Jan 54, 37p
Contract DA30 069ORD1216, Proj. TB4 15
WAL 401/214

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Titanium alloys, Phase studies), (*Phase studies, Titanium alloys), Chromium alloys, Vanadium alloys, Silicon alloys, Carbon alloys, Nitrogen, Hydrogen, High-temperature research.

A literature survey of the Ti-Cr-V system was made and anticipated isothermal sections were drawn. Ninety-six alloys containing up to 40 weight percent total alloying addition were prepared to delineate the phase system from 500 C to the solidus. A literature survey of the Ti-Si-C system was made and anticipated isothermal sections were drawn. Sixty-one alloys containing up to 24 weight percent silicon and 4.8 weight percent carbon were prepared to delineate the phase system from 700 to 1400 C. A literature survey of the Ti-N-H system was made. Apparatus to delineate this system by the 'equilibrium pressure' technique is being built. Nine binary Ti-N alloys have been melted as test alloys. (Author)

IS-986 Div. 17, 25
CFSTI Prices: HC$2.00 MF$0.50

Ames Lab., Iowa.
THE CREEP OF THORIUM NEAR ROOM TEMPERATURE,

by D. T. Peterson and J. D. Young. Sep 64, 24p
Contract W-7405-ENG-82
Unclassified report

Descriptors: (*Thorium, Creep), (*Creep, Thorium).

LA-3191-MS Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Los Alamos Scientific Lab., Univ. of California, N. Mex.
METALLOGRAPHIC PREPARATION AND OBSERVATIONS OF SOME PLUTONIUM-CARBON ALLOYS,
by K. Allan Johnson. 5 Nov 64, 16p Unclassified report
Contract W-7405-ENG-36

Descriptors: (*Plutonium alloys, Metallography), (*Carbon alloys, Microstructure).

LA3192-MS Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Los Alamos Scientific Lab., Univ of California, N. Mex.
TENSILE TESTS ON INVAR SHEET AT CRYOGENIC TEMPERATURES,
by David T. Eash. 4 Nov 64, 12p Unclassified report
Contract W-7405-ENG-36

Descriptors: (*Iron alloys, Tensile properties), (*Nickel alloys, Cryogenics).

18. Military Sciences and Operations

AD-434 662 Div. 18, 32
CFSTI Price HC$2.00

Institute for Defense Analyses, Arlington, Va.
Economic and Political Studies Div.
U. S. MILITARY COMMITMENTS,
by Elizabeth C. Roy. Jun 63, 42p
Research paper no. P-79, IDA-HQ-63-1947
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*National defense, Armed Forces (United States)), (*Foreign policy, Armed forces operations), Military personnel, Military facilities, Military organizations, Operations research, Social communications, Public relations, Political science.

The purpose of this paper is to bring together in a single reference document those agreements and statements that explicitly or implicitly define conditions under which US military forces might become involved in armed conflict abroad. It is intended to provide conveniently accessible information on the range and nature of the wide variety of treaties, agreements, and declarations which, collectively and individually, influence the extent of US military commitments overseas. (Author)

19. Navigation

Patent 3,175,217 Div. 19, 8

DIRECTION FINDER.
Patent assigned to Army,
by Julius A. Kaiser, Jr., Howard B. Smith, Jr., John H. Little, and William H. Pepper. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Direction finding, Spiral antennas), Signals, Electromagnetic waves, Circuits, Phase (Electronics), Patents.

The direction finder is utilized for obtaining directional information through the utilization of the directional sensitivity characteristics of a two-wire spiral antenna. The passive system has no moving parts.

PB-167 300 Div. 19, 33
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
THE NAVIGATOR'S CHART MATE,
by Herman C. Anderson. 1963, 17p
Unclassified report

1963 ASP-ACSM Convention held at the Shoreham Hotel, Washington, D. C., 24-30 Mar 63
Available copy will not permit fully legible reproduction.

Descriptors: (*Navigational aids, Marine safety equipment), (*Marine safety equipment, Navigational aids), Reviews, Periodicals, Water traffic, Shipping (Marine).

The Notice to Mariners is a form of public announcement for the improvement of the means for navigating safely the vessels of the Navy, the Mercantile Marine and for the benefit of navigators generally. It concerns aids to navigation, channel conditions, dangers to navigation, marine danger areas, and general information reports. It is particularly designed for the correction of Nautical Charts, Sailing Directions, Light Lists and other publications aboard ship.

20. Nuclear Physics and Nuclear Chemistry

AD-401 761 Div. 20, 16
CFSTI Price: HC$2.00

Naval Medical Research Lab., New London, Conn.
TRAINING MANUAL FOR RADIATION MONITORING TEAMS.
Vol. 21, no. 28,
by J. Richard Briggs. 15 Dec 62, 45p
Rept. no. 397, MR005.14-3002-4.08
Proj. MR005 14 3002 4 08
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Instruction manuals, Health physics), (*Health physics, Training), (*Radiation monitors, Instruction manuals), Radiation hazards, Radiological contamination, Radiological dosage, Reactor accidents, Radiobiology, Casualties, Therapy, Naval personnel, Military training.

This report provides basic information and guidance for the training of radiation monitoring teams made up of

candidates with little of no knowledge of atomic or nuclear radiation. As a practical approach to the subject of radiation biology, a brief review of the relevant mathematics and physics is presented. Familiar examples and situations are used to illustrate important aspects and procedures, and finally, specific action and details are set forth as a guide for team action. Radiation monitoring teams are of primary importance in the initial handling of any accident involving radioactive material. The training and skill acquired by such teams may well be the factor of control required in emergencies until more highly trained personnel are available. These teams add immeasurably to the ability of ships and other activities in coping with all phases of control of radioactive contamination, and also in supplimementing work done by more highly skilled and trained personnel. (Author)

ANL-6980 Div. 20
CFSTI Prices: HC$2.00 MF$0.50

Argonne National Lab., Ill.
A STUDY OF THE INITIATION OF NUCLEATE BOILING IN THE LIQUID METALS,
by Robert E. Holtz. Dec 64, 22p
Contract W-31-109-ENG-38

Unclassified report

Descriptors: (*Liquid metals, Nucleate boiling), (*Heat transfer, Reactor materials).

BMI-1708 Div. 20, 14
CFSTI Prices: HC$1.75 MF$0.75

Battelle Memorial Inst., Columbus, Ohio.
PREPARATION AND EVALUATION OF ALUMINA-COATED FUEL PARTICLES,
by Melvin F. Browning, Virginia M. Secrest, and John M. Blocher, Jr. 20 Jan 65, 74p
Contract W-7405-ENG-92

Unclassified report

Descriptors: (*Reactor fuels, Ceramic coatings), (*Ceramic coatings, Reactor fuels).

BNL-888 Div. 20
CFSTI Prices: HC$1.75 MF$1.00

Brookhaven National Lab., Upton, N. Y.
NATURE OF MATTER. PURPOSES OF HIGH ENERGY PHYSICS,
ed. by Luke C. L. Yuan. Jan 65, 154p BNL-T-360
Contract AT(30-2)-GEN-16

Unclassified report

Descriptors: (*Elementary particles, Particle accelerators), (*Particle accelerators, Nuclear physics).

BNL-896 Div. 20, 21
CFSTI Prices: HC$3.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
HIGH-TEMPERATURE LIQUID-METAL TECHNOLOGY REVIEW. A BIMONTHLY TECHNICAL PROGRESS REVIEW. VOLUME 2, NO. 5.
Oct 64, 43p BNL-PR-11
Contract AT-30-2-GEN-16

Unclassified report

Descriptors: (*Liquid metals, Nucleate boiling), (*Nuclear propulsion, Energy conversion).

CONF-641002 Div. 20, 16
CFSTI Prices: HC$6.00 MF$1.25

Division of Isotopes Development (AEC), Washington, D.C.
RADIATION PASTEURIZATION OF FOODS. SUMMARIES OF ACCOMPLISHMENT PRESENTED AT FOURTH ANNUAL CONTRACTORS MEETING, OCTOBER 21-22, 1964.
1965, 216p

Unclassified report

Descriptors: (*Irradiated foods, Nuclear industrial applications), (*Nuclear industrial applications, Irradiated foods), (*Pasteurization, Isotope separation).

EGG-1183-1071 Div. 20, 21
CFSTI Prices: HC$2.00 MF$0.50

Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev.
SNAPTRAN 2/10A-3 PHOTOGRAPHY.
30 Jul 64, 36p Rept. no. L-676

Unclassified report

Descriptors: (*Nuclear reactors, Instrumentation), (*Reactor safety systems, Photography).

HW-71500B Div. 20, 17
CFSTI Prices: HC$4.00 MF$0.75

Hanford Atomic Products Operation, Richland, Wash.
THE H-3 IRRADIATION EXPERIMENT: IRRADIATION OF EGCR GRAPHITE.
Interim rept. no. 2,
by J. W. Helm. Sep 64, 109p
Contract AT(45-1)-1350

Unclassified report

Descriptors: (*Graphite moderated reactors, Radiation damage), (*Gas cooled reactors, Radiation damage).

HW-81334 (Pt. 2) Div. 20, 17
CFSTI Prices: HC$4.00 MF$1.00

Hanford Atomic Products Operation, Richland, Wash.
SELECTED MECHANICAL PROPERTIES OF IRRADIATED METALS AND ALLOYS,
by Spencer M. Bush. 1 Oct 64, 118p

Unclassified report

Descriptors: (*Reactor materials, Radiation damage), (*Radiation damage, Metallography).

IDO-24467 Div. 20
CFSTI Prices: HC$6.00 MF$1.25

Babcock and Wilcox Co., Lynchburg, Va.
Atomic Energy Div.
ADVANCED TEST REACTOR.
Final shielding design rept.,
by J. O. Howard and G. M. Jacks. Dec 63, 188p
Contract AT(10-1)-1075

Unclassified report

Descriptors: (*Test reactors, Reactors shielding calculations), (*Reactor shielding calculations, Test reactors).

KLX-1866 Div. 20
CFSTI Prices: HC$3.00 MF$0.75

Vitro Engineering Co., New York.
PRELIMINARY DESIGN REPORT. TITLE I ON MOBILE GAMMA IRRADIATOR.
30 Oct 64, 98p
Contract AT(30-1)-3389

Unclassified report

Descriptors: (*Fruits, Radiation effects), (*Food, Preservation).

LA-3060 Div. 20, 15
CFSTI Prices: HC$2.00 MF$0.50

Los Alamos Scientific Lab., Univ. of California, N. Mex.
A METHOD OF MOMENTS FOR SOLVING THE NEUTRON TRANSPORT EQUATION,
by Bengt G. Carlson. 14 Jul 64, 46p
Contract W-7405-ENG-36

Unclassified report

Descriptors: (*Neutron transport theory, Mathematical analysis).

MCW-1488 Div. 20
CFSTI Prices: HC$2.00 MF$0.50

Mallinckrodt Chemical Works, Weldon Spring, Mo. Uranium Div.
EQUILIBRIUM STRUCTURES IN THE HIGH URANIUM-ALUMINUM ALLOYS SYSTEM,
by J. A. Straatmann and N. F. Neumann. 11 Nov 64, 23p
Contract W-14-108-Eng-8

Unclassified report

Descriptors: (*Uranium alloys, Reactor fuels), (*Aluminum alloys, Reactor fuels).

NAA-SR-8887 Div. 20, 17
CFSTI Prices: HC$0.75 MF$0.50

Atomics International, Canoga Park, Calif.
URANIUM CARBIDE PROCESS DEVELOPMENT FOR THE ADVANCED SODIUM COOLED REACTOR.
by J. W. Carroll, D. R. Turner, and M. H. Binstock.
1 Feb 65, 28p
Contract AT(11-1)-GEN-8

Unclassified report

Descriptors: (*Ceramic materials, Radiation damage), (*Sodium-graphite reactors, Reactor fuels), (*Uranium compounds, Carbides).

NAA-SR-8955 Div. 20, 17
CFSTI Prices: HC$1.50 MF$0.75

Atomics International, Canoga Park, Calif.
THE NAA 47 U - 10 Mo FUEL IRRADIATION PROGRAM FOR HNPF CORE I.
by A. R. Schmitt, R. M. Willard and D. K. Magnus.
1 Feb 65, 64p
Contract AT-11-1-GEN-8

Unclassified report

Descriptors: (*Ceramic materials, Radiation damage), (*Uranium alloys, Radiation damage), (*Molybdenum alloys, Radiation damage).

NAA-SR-8956 Div. 20, 17
CFSTI Prices: HC$0.75 MF$0.50

Atomics International, Canoga Park, Calif.
IRRADIATION SWELLING, PHASE REVERSION, AND INTERGRANULAR CRACKING OF U - 10 WT PERCENT Mo FUEL ALLOY,
by R. M. Willard and A. R. Schmitt. 1 Feb 65, 33p
Contract AT(11-1)-Gen-8

Unclassified report

Descriptors: (*Ceramic materials, Radiation damage), (*Uranium alloys, Radiation damage), (*Molybdenum alloys, Radiation damage).

ORNL-3589 Div. 20
CFSTI Prices: HC$2.00 MF$0.50

Oak Ridge National Lab., Tenn.
GAMMA RADIATION DAMAGE AND DECONTAMINATION EVALUATION OF PROTECTIVE COATINGS AND OTHER MATERIALS FOR HOT LABORATORY AND FUEL PROCESSING FACILITIES,
by G. A. West and C. D. Watson. Feb 65, 41p
Contract W-7405-ENG-26

Unclassified report

Descriptors: (*Ceramic materials, Radiation damage), (*Reactor fuel processing, Radiochemistry laboratories), (*Plastic coatings, Decontamination).

Patent 3,174,834 Div. 20, 4, 17

FLUIDIZED BED REACTOR.
Patent assigned to AEC,
by Richard M. Edwards, Sheldon N. Robinson, and Eugene F. Sanders. 23 Mar 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Uranium, Refining (Metallurgy)), (*Uranium compounds, Dioxides), (*Industrial equipment, Design), Ores (Metal sources), Nitrates, Hydrates, Reduction (Chemistry), Fluorides, Heaters, Uranyl radicals, Patents.

Uranyl nitrate hexahydrate may be reduced by the apparatus to dryness and calcined to uranium trioxide in a form which may be reduced to uranium dioxide and fluorinated to UF4. The UF4 may be converted to metal by conventional procedures. Heat is required to carry out the reaction. The apparatus is for treating uranium ores and solutions.

Patent 3,175,131 Div. 20

MAGNET CONSTRUCTION FOR A VARIABLE ENERGY CYCLOTRON.
Patent assigned to AEC,
by Richard J. Burleigh, Elmer L. Kelly, Joseph H. Dorst, and Charles G. Dols. 23 Mar 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Cyclotron magnets, Design), Magnet fields, Construction, Magnet coils, Particle accelerators, Patents.

The magnetic pole pieces are utilized in a cyclotron or accelerator such as is disclosed in patent No. 2,872,574. The pole construction has provision for adjusting the amount of iron at various points to aid in achieving a desired profile and has further provision, in the form of internal annular void spaces, for minimizing saturation distortion, so that the magnet current may be varied without severe deviation from a selected field profile.

Patent 3,175,922 Div. 20, 14

METHOD FOR COATING ACTINIDE PARTICLES.
Patent assigned to AEC,
by John M. Blocher and Melvin F. Browning.
30 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Coatings, Reactor fuels), (*Reactor fuels, Coatings), (*Actinide series, Coatings), (*Uranium compounds, Dioxides), Particles, Oxides, Aluminum compounds, Zirconium compounds, Yttrium compounds, Chromium compounds, Preparation, Chlorides, Vapor, Hydrogen, Hydrolysis, Patents, Ceramic coatings, Refractory coatings.

The refractory coating is for nuclear reactor fuel or blanket particles. The coating may be alumina, zirconia and yttria. The thermal expansion characteristics are modified by treatment with minor amounts of chromia. A vertical reactor of the fluidized bed type is utilized in the process. The actinide oxide particles are treated with hydrogen containing the vapors of chromyl and aluminum, zirconium, or yttrium chloride. Water is introduced during the process to hydrolyze the vapor.

Patent 3,175,955 Div. 20

GRADIENT FUEL PLATES.
Patent assigned to AEC,
by Richard D. Cheverton. 30 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Reactor fuel elements, Nuclear reactors), Fission neutrons, Patents.

The fuel element is for reactors of the flux-trap design. The fuel element plate contains a fissionable fuel and a burnable poison distributed in a concentration gradient across the width of the element. The burnable poison is distributed in a concentration gradient which differs in magnitude from the fissionable fuel concentration gradient.

PB-167 111 Div. 20, 29
CFSTI Prices: HC$3.00 MF$0.75

Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
RESEARCH INTO THE RADIO-ACTIVE CONTAMINATION OF FOODSTUFFS OF ANIMAL ORIGIN (Recherches sur la Contamination Radioactive des Aliments d'Origine Animale),
by Lothar Leistner. Mar 65, 75p CEA-R-2738
EUR 2226f Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Ecology, Radiological contamination), (*Radiological contamination, Food), (*Food, Radiological contamination), Radiobiology, Anamials, Meat, Seafood, Milk, France.

The author assembles in a very complete way all the actually available data relating to the transfer of the most important radionuclides from the environment through animal products to man. As these are not directly utilizable for the countries of the European Community, he proposes to go further into the question in order to be able to take into account the changing ecological conditions. (Author)

PB-167 115 Div. 20
CFSTI Prices: HC$2.00 MF$0.50

Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
USE OF A MOVING-BED ION-EXCHANGE COLUMN FOR PLUTONIUM PURIFICATION (Utilisation d'une Colonne Echangeuse d'Ions a Lit Mobile pour la Purification du Plutonium),
by Jean Sabatier. Mar 65, 26p CEA-R-2773
Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Plutonium, Purification), (*Ion exchange, Plutonium), Separation.

When large amounts of fissile matter have to be purified on ion exchange resins, it is difficult to use a fixed bed because of its limiting maximum size. With a moving bed it is possible to ensure a continuous production which can easily be integrated into a purification line on account of its large production capacity. The installation described in this report is derived from an American prototype designed for uranium separation. As a result of many modifications, it is suitable for the purification of plutonium several such columns will shortly be operating in various French centres. The moving bed column, which has a diameter of 25 mm, was first tried with the uranium-thorium mixture; then, after modifications on the plutonium-uranium mixture. The production capacity will depend on the plutonium concentration which can be tolerated in the effluents. It is possible to treat 150 gm/day of plutonium along; the effluents obtained have a concentration of around of 1 mg/1. (Author)

PB-167 116 Div. 20
CFSTI Prices: HC$4.00 MF$1.00

Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
CONTRIBUTION TO THE STUDY OF NEUTRON PROPAGATION IN CAVITIES (Contribution a l'Etude de la Propagation des Neutrons dans les Cavites),
by Gilbert Hasselin. Mar 65, 132p CEA-R-2774
Unclassified report

Text in French; Summary in English.

Descriptors: (*Neutrons, Propagation), Albedo, Monte Carlo method, Neutron reactions, Beam holes, France.

In large size cavities where the dimensions of the holes are greater than the mean free path of the radiations, the neutron propagation calculations are carried out by taking into account the effect of the medium surrounding the hole using a reflection coefficient or albedo. In this work the fast neutron albedos

are obtained for various materials and these results are applied for a MONTE-CARLO propagation calculation. A comparison of this calculation with experimental results shows the validity of the method. (Author)

PB-167 167 Div. 20
CFSTI Prices: HC$4.00 MF$0.75

Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
THEORETICAL ASPECTS OF NEUTRON INTERACTION. PART I. INTERACTION PROGRAMME FOR IBM 7094. Part II. THE SHIELDING SUB-PROGRAMME (Aspects Theoriques de l'Interaction Neutronique. Annexe I. Programme Interaction pour IBM 7094. Annexe II. Sous Programme Ombre,
by Jean Moret-Bailly, Francois Penet, and Jean-Claude Spinelli. 1965, 112p CEA-R-2614
Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Neutron reactions, Theory), (*Reactor shielding calculations, Fission neutrons), Programming (Computers), Shielding, France.

PART I: Methods are described for obtaining the equations for a system of elements containing fissile matter: (a) by using the balance after fission, (b) by using the balance before fission, (c) by the evolution equations. All these methods lead to equivalent matrices whose greatest proper value is the multiplication coefficient for the system K. It is shown how to calculate K. From this it is possible to deduce the rules which generalize the criterion for the bounded solid angle. An IBM 7094 programme applies this theory to the calculation of the installations made up of a maximum of 500 elements. It calculates the effective values of K, the leaks, the solid angles and then K. PART II: Subprogram calculating the shielding between elements.

PB-167 172 Div. 20, 4
CFSTI Prices: HC$2.00 MF$0.50

Commissariat a l'Energie Atominque, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
POTENTIOMETRIC DETERMINATION OF FREE NITRIC-ACID IN TRILAURYLAMINE SOLUTIONS CONTAINING PLUTONIUM NITRATE (Dosage Potentiometrique de l'Acidite Nitrique Libre dans les Solutions Organiques de Trilaurylamine),
by Jean-Jacques Perez and Jean-Claude Saey. Mar 65, 45p CEA-R-2766
Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Plutonium compounds, Nitrates), (*Volumetric analysis, Nitric acid), (*Nitric acid, Volumetric analysis), Amines, Solutions, Thorium compounds, Aromatic compounds, Halogenated hydrocarbons, France.

A potentiometric method of determination of the free nitric acid in trilaurylamine solutions containing plutonium or thorium nitrates is described. The potentiometric titration is carried out in a mixtrue of benzene and 1, 2-dichloro ethane with a standard solution of trilaurylamine as the titrant. When thorium nitrate is present the metal complex is not dissociated then the titration has a single end-point. In the case of plutonium nitrate the partial dissociation of the plutonium complex corresponds to a second point. The experimental error in duplicate analyses of 50 samples is about 1 per cent for free acid concentrations in the range of 0, 03 to 0, 1 N and plutonium concentrations between 1 to 5 g/l. (Author)

PB-167 174 Div. 20
CFSTI Prices: HC$1.00 MF$0.50

Commissariat a l'Energie Atomique, Chuselan (France). Centre de Production de Plutonium de Marcoule.
CAN RUPTURE DETECTION IN G 3 - OPERATIONAL EXPERIENCE (Detection de Rupture de Gaines G 3 Experience d'Exploitation)
by Julien Plisson. 1964, 25p CEA-R-2710
Unclassified report

Available copy will not permit fully legible reproduction.
Text in French; Attached Summary in English.

Descriptors: (*Reactor fuel cladding, Rupture), (*Fission products, Measurement), (*Heterogeneous reactors, France).

The role and principles of detection of rupture in the slugs or cladding for fuel of reactor G 3 are described. The working conditions and conclusions reached after 4 years of operation for this method of detection are described as are the modifications made to the original installation, the tests carried out, and the experiments under way.

SAN-8002 Div. 20
CFSTI Prices: HC$7.00 MF$2.00

San Francisco Operations Office (AEC), Berkeley, Calif.
PROCEEDINGS OF THE SODIUM COMPONENTS INFORMATION MEETING HELD IN PALO ALTO, CALIFORNIA, AUGUST 20-21, 1963.
May 64, 316p CONF-258 Unclassified report
Contract AT(04-3)-189

Descriptors: (*Sodium-graphite reactors, Reactor operation), (*Reactor system components, Liquid metals).

SLAC-32 Div. 20
CFSTI Prices: HC$2.25 MF$0.75

Stanford Linear Accelerator Center, Stanford Univ., Calif.
TWO-MILE ACCELERATOR PROJECT.
Quarterly status rept. 1 Apr-30 Jun 64.
Oct 64, 107p Unclassified report
Contract AT(04-3)-400

Descriptors: (*Particle accelerators, Instrumentation), (*Electron beams, Particle accelerators).

TID-4005 (Pt. 1, 8th Ed.) Div. 20
CFSTI Prices: HC$4.00 MF$1.75

Division of Research (AEC), Washington, D. C.
SUMMARIES OF THE USAEC BASIC RESEARCH PROGRAMS IN METALLURGY, SOLID STATE PHYSICS AND CERAMICS (FY 1964).
Jan 65, 384p
Unclassified report

Descriptors: (*Metallurgy, Nuclear physics), (*Solid state physics, Nuclear physics), (*Ceramic materials, Nuclear physics).

TID-20583 Div. 20
CFSTI Prices: HC$4.00 MF$0.75

Division of Safety Standards (AEC), Washington, D. C.
LEAKAGE CHARACTERISTICS OF STEEL CONTAINMENT VESSELS AND THE ANALYSIS OF LEAKAGE RATE DETERMINATIONS,
by R. R. Maccary, J. J. Dinunno, and A. B. Holt.
May 64, 112p

Unclassified report

Descriptors: (*Containment, Nuclear reactors), (*Pressure vessels, Steel), (*Reactor safety systems, Nonleakage probability).

TID-21620 Div. 20
CFSTI Prices: HC$3.00 MF$0.75

Oak Ridge National Lab., Tenn.
LIST OF AEC RADIOISOTOPE CUSTOMERS WITH SUMMARY OF RADIOISOTOPE SHIPMENTS, FY 1964,
by P. S. Baker. 1965, 96p
Contract W-7405-ENG-26

Unclassified report

Descriptors: (*Radioactive isotopes, Transportation).

WAPD-TM-471 Div. 20
CFSTI Prices: HC$3.00 MF$0.75

Bettis Atomic Power Lab., Pittsburgh, Pa.
RADIATION DAMAGE EXPOSURE AND EMBRITTLEMENT OF REACTOR PRESSURE VESSELS,
by K. Shure. Nov 64, 67p
Contract AT(11-1)-GEN-14

Unclassified report

Descriptors: (*Pressure vessels, Radiation damage), (*Steel, Transition temperature), (*Nuclear reactors, Design).

WCAP-6064 Div. 20
CFSTI Prices: HC$4.00 MF$1.00

Westinghouse electric Corp., Pittsburgh, Pa.,
Atomic Power Div.
YANKEE CORE EVALUATION PROGRAM.
Quarterly progress rept. for the period ending 30 Sep 64.
Oct 64, 144p
Contract AT(30-1)-3017

Unclassified report

Descriptors: (*Reactor cores, Reactor fuel elements), (*Reactor fuel elements, Control rods).

WCAP-6070 Div. 20
CFSTI Prices: HC$4.00 MF$1.00

Westinghouse Electric Corp., Pittsburgh, Pa.
Atomic Power Div.
YANKEE CORE EVALUATION PROGRAM.
Quarterly progress rept. for the period ending 31 Dec 64,
by M. J. O'Boyle. Jan 65, 117p
Contract AT(30-1)-3017

Unclassified report

Descriptors: (*Reactor cores, Reactor fuel elements), (*Reactor fuel processing, Reactor cores).

21. Nuclear Propulsion

No entries

22. Ordnance

Patent 3,173,921 Div. 22, 4, 10

5-DINITROMETHYLTETRAZOLE AND SALTS THEREOF.
Patent assigned to Army,
by Fred J. Einberg. 16 Mar 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Explosive materials, Preparation), (*Propellants, Preparation), (*N-heterocyclic compounds, Synthesis (Chemistry)), Nitrates, Nitriles, Salts, Silver compounds, Ammonium compounds, Gas generating systems, Sodium compounds, Azides, Chlorides, Patent.

The compound is useful for explosives, propellants, gas generants for gas activated devices and the like. It is prepared from specific amounts of ammonium dinitroacetonitrile, sodium azide and ammonium chloride. Asalt of 5-dinitromethyltetrazole, including a silver salt, is claimed.

Patent 3,175,464 Div. 22

SAFETY BRAKE MECHANISM FOR EXTERNALLY POWERED AUTOMATIC GUN.
Patent assigned to Army,
by John G. Rocha. 30 Mar 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Automatic weapons, Safety devices), (*Safety devices, Automatic weapons), Guns, Firing mechanisms (Weapons), Patents.

The safety mechanism automatically halts the firing operation of an automatic gun while the firing chamber in the barrel is still occupied by a fired cartridge case. The externally powered gun is provided with a brake mechanism which is positively energized by each release of the firing trigger to halt the reciprocal barrel at a predetermined point in the firing cycle.

Patent 3,175,490 Div. 22

HYDROSTAT.
Patent assigned to Navy,
by Lester R. Wall. 30 Mar 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Underwater mines, Hydrostats), (*Hydrostats, Underwater mines), (*Mines (Ordnance), Hydrostats), Hydrostatic pressure, Buoyancy, Anchors (Marine), Patents, Minelaying, Mooring.

The adjustable hydrostat is for releasing a bight in the mooring cable of a submarine mine when the mine has risen within the water to a predetermined depth. The hydrostat is of the type that is dropped to the floor of the body of water when the bight is released. The depth responsive bight releasing mechanism includes an overhanging beam. The cantilever beam acts against the hydrostatic pressure of the water.

23. Personnel and Training

No entries

24. Photography and Other Reproduction Processes

Patent 3,174,857 Div. 24

EDGE ISOLATION OF PHOTOGRAPHIC IMAGERY.
Patent assigned to Interior,
by Alva B. Clarke. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Photographic images, Photographic film), Patents, Phosphorescent materials, Photographic emulsions, Infrared radiation, Infrared filters, Ultraviolet filters, Photographic tone, Photogrammetry, Aerial photographs, Maps, Terrain.

The method is utilized in the art of photogrammetry as it involves the processing, compilation, and analysis of aerial photographs used in connection with producing topographic maps. The image of a normal negative transparency is reproduced to form an edge-isolated image on a final negative transparency.

Patent 3,175,037 Div. 24, 5

LENS SYSTEM HAVING ULTRA-WIDE ANGLE OF VIEW.
Patent assigned to Navy,
by Howard R. Padgitt. 23 Mar 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Camera lenses, Underwater cameras), Television cameras, Camera tubes, Refraction, Lenses, Patents.

The photographic or television lens system has an ultra-wide angle of view. It is adapted for underwater use. The system includes a lens housing, a hemispherical meniscus dome, first and second negative meniscus elements, a positive doublet component, a positive meniscus, and a television image orthicon.

PB-167 177 Div. 24, 2, 12
CFSTI Prices: HC$2.00 MF$0.50

Meteorological Satellite Lab., Weather Bureau,
Washington, D. C.
SPECTRAL REFLECTANCE PHOTOGRAPHY OF THE EARTH FROM MERCURY SPACECRAFT MA-8,
by Stanley D. Soules. Nov 63, 36p Rept. no.
MSL-22
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Aerial photography, Manned spacecraft), (*Photographic techniques, Aerial photography), Satellites (Artificial), Orbital trajectories, Photographic equipment, Spectra (Visible and Ultraviolet), Filters (Electromagnetic wave), Colors, Atmosphere, Optical properties, Clouds, Earth.

A series of 13 black and white photographs of the earth were taken through six color filters in the visible spectrum during Mercury Spaceflight MA-8 by Astronaut Walter M. Schirra, Jr. on October 3, 1962. A description of the experimental equipment and the calibration procedure is given. The photographs show that features of clouds and earth can be seen best when viewed in longer wavelengths. The scattering of light at short wavelengths generally is high and while scattering is lower at longer wavelengths, it appears to vary over large geographic areas. The troposphere forms a distinct visible band at the earth's limb. Microdensitometer traces from one negative are presented to show the changes which occur in relative brightness within each of the six filter sections. Brightness ratios from selected areas in the pictures are presented also. (Author)

PB-167 296 Div. 24, 2
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
MAKE THE NEXT THE LAST,
by Merlyn E. Natto. 1960, 7p
Unclassified report

For presentation at the 1960 ACSM-ASP Convention held in Washington, D. C., 20-26 Mar 60.

Descriptors: (*Aerial photography, Photogrammetry), (*Photogrammetry, Aerial photography), Reviews, Mission profiles, Personnel, Photographic equipment, Aircraft.

The purpose of the paper is to present a few of the problems and projects of the photogrammetry-aerial photographic operations of the Coast and Geodetic Survey Air Photo Mission.

25. Physics

AD-272 769 Div. 25, 14, 17
CFSTI Price: HC$8.10

Cryogenic Engineering Lab., National Bureau of Standards, Boulder, Colo.
A COMPENDIUM OF THE PROPERTIES OF MATERIALS AT LOW TEMPERATURE (PHASE II).

Rept. for Jan 59-Jan 61,
ed. by Richard B. Stewart and Victor J. Johnson. Dec 61, 508p
Contract AF33 616 59 6, Proj. 7360, Task 73603
WADD TR-60-56 P4

Unclassified report

Descriptors: (*Materials, Low-temperature research), (*Low-temperature research, Materials), (*Cryogenics, Materials), Thermodynamics, Thermal conductivity, Acoustics, Electrical properties, Resistance (Electrical), Physical properties, Fluids, Solids, Liquids, Gases, Liquefied gases, Metals, Alloys, Ceramic materials, Glass, Organic materials, Plastics, Indexes, Bibliographies, Tables.

Phase II of the Compendium includes data sheets on compressibility factor, velocity of sound and entropy of fluids, vapor-liquid equilibrium concentration of binary mixtures of fluids, and electrical resistivity and thermal conductivity integrals of metallic solids. Data sheets are included for each of these properties for the following materials: Compressibility Factor (Helium, Hydrogen, Neon, Nitrogen, Air, Methane); Entropy (a T-S diagram for Neon); Velocity of Sound (in liquids: Helium, Hydrogen, Nitrogen, Oxygen, Argon, Methane; in gases: Helium, Hydrogen, Neon, Nitrogen, Oxygen, Air, Carbon Monoxide, Argon, Methane); Liquid-Vapor Equilibrium Concentrations (Helium in Hydrogen, Nitrogen, Methane; Hydrogen in Nitrogen, Carbon Monoxide, Methane; Nitrogen in Oxygen, Carbon Monoxide, Argon, Methane); Electrical Resistivity (53 of the pure metallic elements); and Thermal Conductivity Integrals (44 pure metallic substances, 36 non-ferrous alloys, 9 ferrous alloys and 4 glasses and plastics). In general the data sheets present the data primarily in graphical form, and in addition include tables of selected values, references to the sources of the data and other references. Appropriate comments of interest to the user are also given. (Author)

AD-408 786 Div. 25, 16, 30
CFSTI Price: HC$1.00

American Biophysics Research Lab., Lansdale, Pa.
APPLICATION OF LASERS IN THE BIOLOGICAL SCIENCES.
1959, 24p Rept. no. ABRL-MS-2

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Lasers, Medical research), (*Medical research, Lasers), Eye, Thermal radiation, Surgical techniques, Theory, Biology, Marine biology, Rabbits.

This report is devoted to applications of the laser in the fields of the biological sciences and provides semitechnical descriptions of recent advances in the fields of engineering and physics so that biologists and biophysicists may acquaint themselves with new techniques and instrumentation which will prove useful to them in the pursuit of their research activities. An extensive bibliography and references are included. (Author)

LA-3162 Div. 25
CFSTI Prices: HC$3.00 MF$0.50

Los Alamos Scientific Lab., Univ. of California, N. Mex.
METHOD FOR HIGHLY ACCURATE NUMERICAL SPATIAL INTEGRATION APPLICATION TO LATTICE DYNAMICS OF CUBIC TYPE CRYSTALS,
by W. C. Overton, Jr. and A. F. Schuch.
30 Aug 64, 49p
Contract W-7405-ENG-36

Unclassified report

Descriptors: (*Solid state physics, Integration), (*Crystallography, Mathematical analysis).

PB-167 113 Div. 25, 2
CFSTI Prices: HC$3.00 MF$0.75

Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
DEVELOPMENT OF A METHOD FOR STUDYING NON-LINEAR PHENOMENA IN PLASMA (Mise au Point d'une Methode d'Etude des Phenomenes non Linearies dans un Plasma).
Doctoral thesis,
by Alain Gonfalone. Mar 65, 4p CEA-R-2758
EUR 2277f

Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Plasma physics, Analysis), Electromagnetic waves, High frequency, Electric discharges, Resonance, Ionosphere, Electron density.

The study of non-linear phenomena resulting from the interaction of powerful electro-magnetic waves with an electron gas is the basis of the best methods for measuring the frequency of electronic collisions in the ionosphere. In laboratory plasma the appearance of these phenomena is connected with a powerful critical field. Using a relatively low-power electromagnetic source, a simple hyper-frequency method was developed making it possible to study these phenomena, to measure them, and to put forward an elementary interpretation. An electromagnetic wave provided by a 1 watt klystron interacts with a HF discharge (25 MHz) in the volume of a TE111 cavity. The tube containing the discharge and the axis of the cylindrical cavity are co-linear with a magnetic field which can attain a value such that the wave frequency is equal to the gyromagnetic frequency of the electrons.

PB-167 168 Div. 25, 4
CFSTI Prices: HC$2.00 MF$0.50

Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nuclearires.
TENTATIVE ABSOLUTE ANALYSIS SPARK SOURCE MASS SPECTROMETRY (Essai d'Analyse Absolue par Spectrometrie de Masse a Etincelles.
Doctoral thesis,
by Michel Desjardins. 1965, 39p CEA-R-2721

Unclassified report

Text in French.

Descriptors: (*Mass spectroscopy, Chemical analysis), (*Chemical analysis, Mass spectroscopy), Determination, Impurities, Test methods, France.

By mean of a graphical method developed in our Laboratory, we studied linearity of response of the MS 7 mass spectrometer for impurity determinations over a concentration range of 1 to 1000 ppm (parts per million of atoms). This method consist in transforming optical density measurements into 'true intensities', which are ploted on a log paper against the exposures. A moving transparent ruler graduated at the inverse scale of the exposures allows us to determine directly on the graph, the concentration of impurities in ppm. We have used this method for the determination of sensitivity coefficients in standard samples such as Al, Fe, Cu, Ni,

Zr, and non conducting powders like SiO2 and Al2O3. This study shows that, for the samples studied, the sensitivity coefficients are practically independant of the matrix- and the concentration. Moreover the results show the possibility of obtaining an absolute analysis by spark source mass spectrometry. (Author)

PB-167 170 Div. 25, 17
CFSTI Prices: HC$4.00 MF$0.50

Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
COMPARATIVE STUDY OF THE CREEP BEHAVIOR OF SINGLE CRYSTALS AND POLYCRYSTALS OF ALPHA URANIUM (Etude Comparee du Comportement au Fluage de l'Uranium Alpha Mono et Polycristallin).
Doctoral thesis,
by Jean-Pierre Andre. 1964, 30p CEA-R-2715
Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Uranium, Creep), (*Creep, Uranium), Deformation, Phase studies, Single crystals, Crystals, Heat of activation, Diffusion, Stresses, Crystal lattice defects.

In the first chapter, one describes the creep machine developed to study the deformation of uranium at high temperature in vacuo with a continuous recording. The second chapter presents the results concerning the polycristals of uranium. The application of the DORN method gives an activation energy for creep of 42 ± 2 Kc, above 550C, equal to the activation energy for self-diffusion. The study of the variation of the creep rate with the applied stress and the metallographic observations of the deformation-induced polygonization allow to conclude that the deformation is controlled by climb of dislocations. In the third chapter, the deformation above 550C of single crystals of uranium (obtained by beta yields alpha change) is studied. The major deformation made is slip. The preexisting polygonization of these single crystals is very stable and the desorientation between adjacent subgrains increases with the deformation. The activation energy for creep is higher than that for polycristals. These results show the influence of the polygonization due to the beta yields alpha change on the creep behavior of alpha uranium. (Author)

PB-167 293 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Electronics Research Lab., Univ. of California, Berkeley.
SYNCHROTRON RADIATION MEASUREMENTS FROM A HOT ELECTRON PLASMA.
Rept. for Jun 63-Jun 64,
by A. J. Lichtenberg, S. Sesnic, and A. W. Trivelpiece.
17 Aug 64, 39p Rept. no. 64-28
Contract AF33 615 1078; Grant NSF GP2239,
Proj. 6899, Task 415001
AFOSR 65-0266; AD 454 768 Unclassified report

Descriptors: (*Plasma medium, Electrons), Synchrotrons, Pulse height analyzers, Plasma physics, Field theory, Magnetic fields, Infrared spectroscopy, Temperature, Stability, Production, X rays.

The synchrotron radiation emanating from a hot-electron plasma produced in a pulsed magnetic mirror field was measured. For peak fields which were varied between 30 and 60 kG with corresponding electron temperatures between 25 and 50 kev the radiation was found to be greater than 0.1 mW/ster at the low field and greater than 1.0 mW/ster at the high field. This variation was consistent with that calculated by integrating the radiation from a single electron over a two dimensional, relativistic Maxwellian with the appropriate temperature. The calculation, together with the measured radiation amplitude, was used to determine the total number of radiating electrons (10 to the 11th power). Preliminary results on the spectral distribution of the radiation were also obtained. The decay of the radiated power is closely correlated with microwave radiation and other diagnostics both in regimes in which the plasma was stable and those in which the plasma developed an instability. The spectral distribution of the radiation was measured. An independent time resolved temperature was calculated from these measurements. (Author)

26. Production and Management

AD-423 199 Div. 26
CFSTI Price: HC$7.00

Cincinnati Milling Machine Co., Ohio.
ELECTRO-DISCHARGE MACHINING PROGRAM.
Final rept. for 15 Nov 60-20 Jul 63,
by Philip E. Berghausen, Harry D. Brettschneider, and Malcolm F. Davis. 20 Jul 63, 347p
Contract AF33 600 42282, Proj. 7 545
ASD TR-63-7-545
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Spark machining, Design), (*Machining, Electric discharge), (*Manufacturing methods, Spark machining), Processing, Materials, Surfaces, Electrodes, Fluids, Circuits, Wiring diagram, Power supplies, Analysis, Servomechanisms, Electroerosive maching, Material removal, Specifications, Bibliographies.

A comprehensive investigation of electro-discharge machining is presented. Special emphasis is given to optimization of process parameters, involving the fundamentals of the process to include machining fluid, electrode (tool) material, machine tool, servomechanism, and power supply in the Phase I program. Operating data and results of a demonstrative program are presented as the Phase II effort. Design and Process Specifications are included as the Phase III program. This is the Final Report and contains all information previously published. (Author)

LA-3181-MS Div. 26, 17
CFSTI Prices: HC$1.00 MF$0.50

Los Alamos Scientific Lab., Univ. of California, N. Mex.
HIGH-DEFORMATION-RATE EXTRUSION OF THIN-WALLED TUNGSTEN HEMISPHERES,
by James M. Dickinson. 1 Aug 64, 17p
Contract W-7405-ENG-36
Unclassified report

Descriptors: (*Hemispherical shells, Tungsten), (*Tungsten, Extrusion).

N65-16176 Div. 26, 14
CFSTI Prices: HC$2.00 MF$0.50

Spindletop Research Center, Lexington, Ky.

FEASIBILITY OF CONTINUOUS FORMING OF BORON CARBIDE MONOFILAMENTS.
Final rept.,
by William E. Kuhn and Victor C. Woodworth.
28 Jan 65, 27p
Grant NsG680
NASA CR-60498
Unclassified report

Descriptors: (*Filaments, Material forming), (*Boron compounds, Carbides), (*Carbides, Filaments), Feasibility studies.

OTR-113 Div. 26
CFSTI Price: HC$0.50

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
ULTRASONIC WELDING AND FABRICATION.
May 65, 13p Unclassified report

Research supported by Inst. of Applied Technology, National Bureau of Standards, Washington, D. C.

Descriptors: (*Ultrasonic radiation, Welding), (*Welding, Ultrasonic radiation), Reviews, Deformation, Refractory metals, Sheets, Rolling (Metallurgy), Encapsulation, Bibliographies, Abstracting, Metals, Seals (Stoppers), Drawing (Machine processing), Wire.

Significant reports covering the period since 1963 were selected for this study, with reference to relevant earlier works. Recent government R and D in this field has dealt with the determination of the effects of ultrasonic energy on the deformation characteristics of metals, and with applications to refractory metals, sheet metal rolling, and encapsulation. (Author)

OTR-115 Div. 26
CFSTI Price: HC$0.50

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
HIGH ENERGY METAL FORMING.
May 65, 18p Unclassified report

Prepared in cooperation with United States Testing Co., Inc., Hoboken, N. J.

Descriptors: (*Explosive forming, Metals), (*Metals, Explosive forming), Extrusion, Sheets, Deformation, Bibliographies, Reviews, Abstracting, Steel, Refractory metals, Mechanical working, Alloys, Rocket cases, Mechanical properties.

Significant reports covering the period since 1962 were selected for this study, with reference to relevant earlier works. Recent years have seen a trend to high-velocity metal forming. Recent government R and D has been directed towards developing the basic parameters of metal performance, and application to metal extrusion and sheet metal forming. This research offers basic information for new applications of this novel approach to metal forming. (Author)

Patent 3,174,620 Div. 26, 30

HERMETICALLY SEALED CONTAINER.
Patent assigned to Air Force,
by Frank R. Edgarton. 23 Mar 65 Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Containers, Hermetic seals), (*Instrumentation, Containers), Guided missiles, Synchros, Controlled atmospheres, Electric connectors, Structural shells, Cylindrical bodies, Metals, Patents, Disks.

The container is for housing and protecting delicate electromechanical devices such as are used on ballistic missiles. The container structure includes a shell member, end disks, exterior and interior mounting lugs, a female socket member for electrical wiring and an opening for a conduit for evacuating the container and charging it with a gas such as nitrogen.

Patent 3,177,567 Div. 26

MATING TOOL.
Patent assigned to Army,
by Ivor H. Gehrman. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Clamps, Electric connectors), (*Electric connectors, Clamps), Patents, Small tools, Positioning devices (Machinery).

The pivoted lever type mechanical advantage tool aids in the mating of multi-pin electrical connectors. The connectors are used in the ground control components of various missile systems. The device has pivoted handles and end portions which are inserted between the flanges of the mated connector and cause the male and female members to separate.

Patent 3,178,150 Div. 26

BOTTOM OUTLET VALVE FOR A MIXING VESSEL.
Patent assigned to Navy,
by Stanley L. Johnson. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Valves, Tanks (Containers)), Patents, Remote control systems.

The bottom outlet valve is for a vessel discharge port. It is particularly designed for track-mounted ordnance and chemical mixing vessels. The arrangement includes a vessel bottom outlet port, a closure member, a discharge port and a closure member activator. The overall length of the valve is reduced without limiting the ability of the valve to accommodate a rapid discharge of the vessel contents. The valve is remote-controlled.

PB-167 255 Div. 26, 17, 22
CFSTI Prices: HC$1.00 MF$0.50

Springfield Armory, Mass.
ELECTROMAGNETIC METHOD OF NONDESTRUCTIVELY EXAMINING COMPONENTS FOR EXCESSIVE DECARBURIZATION.
Technical rept.,
by H. P. Hatch and K. A. Fowler. 14 Apr 64, 19p
Rept. no. SA-TR19-1508
AD 444 348; N64 33719 Unclassified report

Descriptors: (*Carbon, Metallography), (*Non-destructive testing, Electromagnetic fields), (*Electromagnetic fields, Non-destructive testing), Roller bearing, Shafts, Hardness, Surfaces, Surfaces properties, Carbon, Steel, Quality control, Automatic weapons, Test methods, Heat treatment, Harmonic analysis.

An electromagnetic test is described that was developed to nondestructively detect severely decarburized components. The test method is based on measurements of the third harmonic component of an induced secondary voltage. This test parameter was found to correlate well with surface hardness which is a measure of the severity of decarburization. On the basis of the results of this investigation, it can be concluded that harmonic analysis of an induced voltage is applicable to the nondestructive evaluation of the surface condition of steel. Procedure is described and results are discussed. (Author)

PB-167 371 Div. 26, 30
CFSTI Prices: HC$2.00 MF$0.50

Jackson and Moreland, Inc., Boston, Mass.
STRESS RELIEVING THE EXHAUST GAS COOLER, NEW ALTITUDE TEST CHAMBER,
by A. Chibaro, D. A. Mooney, and R. W. Stewart.
26 Oct 62, 47p
Contract NBy44931

Unclassified report

Descriptors: (*Heat treatment, Altitude chambers), (*Cooling, Exhaust gases), (*Altitude chambers, Cooling), (*Stresses, Altitude chambers), (*Test equipment, Altitude chambers), Fracture (Mechanics), Thermal stresses, Reinforcing materials, Rings, Structures, Mathematical analysis, Test facilities.

An investigation was made of the feasibility, costs and benefits of thermal stress relieving of the new Exhaust Gas Cooler at the Naval Air Turbine Test Station, Trenton, New Jersey. Thermal stress relieving reduces the probability of brittle fracture below the nil-ductility transition temperature due to residual and low load stresses. However, it would not eliminate the possibility of brittle fracture due to high stress concentrations resulting from static and internal pressure loadings at defects or stress raisers created by the geometry of the vessel. Because of the many problems associated with thermal stress relieving the exhaust gas cooler, and the fact that the facility can be made acceptable for use by pneumatic testing under controlled temperature (100 F) conditions, it is not believed that the additional advantages resulting from thermal stress relieving justify the additional costs, extended time delay, and the risk of resulting damage to the facility. A detailed account of the factors leading to the conclusions and recommendations is presented.

27. Propulsion Systems

AD-411 117 Div. 27, 30
CFSTI Price: HC$9.95

Garrett Corp., Los Angeles, Calif. Airesearch Mfg. Div.
TURBOJET ENGINE ANALYZER SYSTEM STUDY,
by W. I. Rumer. Jun 63, 695p
Contract AF33 616 8510, Proj. 3147, Task 314702
ASD TDR-62-842

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Turbojet engines, Test equipment), Data processing systems, Performance (Engineering), Analysis, Axial-flow compressors, Pressure, Turbines, Temperature, Maintenance, Feasibility studies, Test methods, Checkout equipment, Stresses, Mathematical prediction, Probability, Failure (Mechanics), Programming (Computers), Thermodynamics, Mathematical models, Malfunctions.

The system combines airborne and ground equipment to automatically collect and process engine performance and stress data. System functions are: (1) verify that an engine is operational; (2) predict that the engine will accomplish the next mission with high confidence; (3) predict the expected time remaining before maintenance is required; (4) diagnose a faulty engine. The study encompassed data-collecting requirements, i.e., reference data (aircraft number, elapsed time, etc.), performance data (compressor discharge pressure, turbine discharge temperature, etc.), and mechanical parameters (oil temperature, breather pressure, etc.); a thermodynamic model; an analyzer system, its components and diagnostic function; data-collecting hardware; and analytical procedures. The report includes extensive tables, curves, and equations relating to diagnostic procedures, as well as recorder and converter techniques and airline and military failure data regarding present diagnostic and maintenance experience. Although applicable to the referenced turbojet engines, modifications to accommodate other engine types as well as to incorporate other parameters not presently anticipated can readily be made. The system is not general-purpose but is tailored to each aircraft-engine combination. (Author)

Patent 3,174,279 Div. 27

ROCKET THRUST CHAMBER.
Patent assigned to NASA,
by Edward F. Baehr. 23 Mar 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Rocket motor nozzles, Thrust), Combustion chambers, Design, Rocket motors, Structural parts, Construction.

The large area-ratio nozzles are for a lightweight rocket motor thrust chamber construction such as is disclosed in patent No. 2,943,442. The thrust chamber is composed of a combustion chamber, a throat, and a nozzle portion. The nozzle portion is formed of a compound wall having radially spaced inner and outer surfaces formed from a plurality of elongated compound channel members disposed in contiguous side-by-side relation to define an internal annular chamber.

Patent 3,174,283 Div. 27

EXPENDABLE BARRIER.
Patent assigned to Navy,
by Luigi Crocco, David T. Harrje and Frederick H. Reardon. 23 Mar 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Rocket motors (Liquid propellant), Design), (*Combustion chambers, Rocket motors (Liquid propellant)), Rocket motor (Liquid propellant), Ignition, Combustion, Stability, Control, Plastics, Aluminum, Patents, Separation.

The barrier is used in a liquid propellant rocket motor. The mechanical fixture is in the form of one or more plane surfaces extending from the injector face throughout the length of the combustion chamber. The barrier is made of aluminum or plastic and is consumed after an even unvarying thrust is being delivered.

PB-167 295 Div. 27, 25
CFSTI Prices: HC$2.00 MF$0.50

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE MAGNETOHYDRODYNAMIC ARC THRUSTER,
by Peter A. Schoeck. Sep 64, 27p
AEDC-TDR-64-182
Contract AF40 600 1000
AD 447 481; N64 31068

Unclassified report

Descriptors: (*Magnetohydrodynamics, Thrust), (*Arc-jet engines, Space propulsion), Convergent-divergent nozzles, Electric arcs, Magnetic fields, Gas flow, Plasma jets, Velocity.

The effect of the self-induced magnetic field of an electric arc of diverging current cross section with an electrode configuration suitable for a thruster is investigated. Basic relationships for thrust, jet velocity, and mass flow rate are developed in terms of arc parameters which are current, voltage, and an electrode parameter for a simplified arc model. It is predicted that with currents on the order of 1000 amp, voltages on the order of 100 v, and mass flow rates on the order of .01 to .1 g/sec, jet velocities on the order of 100,000 m/sec, and thrusts on the order of one Newton can be achieved and that therefore the arc jet could be used as a thruster for space missions that heretofore were thought to be restricted to electrostatic propulsion. (Author)

28. Psychology and Human Engineering

AD-69 773 Div. 28, 6, 8
CFSTI Price: HC$2.00

Office of Research Administration, Univ. of Michigan, Ann Arbor.
A THEORY OF RECOGNITION,
by W. P. Tanner, Jr. May 55, 48p
Technical rept. nos. TR-50, ORA-2262-72-T
Contract DA36 039sc63203, Projs. 3 99 04 042, 194B

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Communication theory, Perception), (*Perception, Theory), (*Signals, Identification), Decision theory, Statistical analysis, Decision making, Reasoning, Sound, Demodulation.

The theory of statistical decision has previously been applied to the problem of the sensory detection of signals. In this paper a simple recognition problem is analyzed in the framework of statistical decision. The extension of the detection theory to include the problem of recognition is the first phase of a general expansion of the theory to emcompass the field of perception. A brief review of the detection theory, and its correspondence with data presently available, is presented. This presentation is followed by a development of the recognition theory for the simple case studied. Certain principles are outlined for the general extension of the theory. The paper is presented largely in terms of auditory theory, although it is felt that the theory is applicable to the entire field of human perception. (Author)

PB-167 257 Div. 28, 5
CFSTI Prices: HC$3.00 MF$0.50

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
PSYCHOACOUSTIC SPEECH TESTS: A MODIFIED RHYME TEST,
by Arthur S. House, Carl Williams, Michael H. L. Hecker, and Karl D. Kryter. Jun 63, 52p
Rept. no. BBN-1021
Contract AF19 628 382, Proj. 7684
ESD TDR-63-403; AD 411 983

Unclassified report

Descriptors: (*Psychoacoustics, Tests), (*Voice communication systems, Effectiveness), (*Speech, Intelligibility), (*Test construction (Psychology), Psychoacoustics), Speech transmission, Verbal behavior.

A multiple choice, easily scored speech test was developed and evaluated. It was found that the speech intelligibility scores obtained with this test remain consistent for a given communication system when tested nearly daily for a period of one month using enlisted personnel as test listeners. (Author)

PB-167 304 Div. 28
CFSTI Prices: HC$2.00 MF$0.50

Hollins Coll., Va.
MEMBERSHIP PATTERNS AND INFORMATION EXCHANGE IN PSYCHOLOGICAL ORGANIZATIONS. Progress rept.,
by Paul J. Woods. 7 Dec 62, 42p

Unclassified report

Rept. for NSF-APA Project on Scientific Information Exchange.

Descriptors: (*Psychology, Scientific organizations), Electronics, Psychophysiology, Psychometrics, Ecology.

Fourteen psychological groups are listed, and information regarding each is given, that were concerned with facilitating communication about scientific information and professional problems, although they were not affiliated with the American Psychological Association. Two of the groups have since become members of the Association, and all but three of them originated within the last 8 years. The groups are as follows. Psychonomic Society. Society for Projective Techniques and the Rorschach Institute, Inc. Psychometric Society. Psychologists in Private Practice. Human Factors Society. Philosophical Psychology Society. Physiological and Comparative Psychologists. Psychologists Interested in the Advancement of Psychotherapy. Section of Animal Behavior and Sociobiology of the Ecological Society of America. Society for Psychophysiological Research. History of Psychology Group. Society of Experimental Psychologists. Group for the Study of Verbal Behavior. Professional Group on Human Factors in Electronics. The extent to which the membership within these groups is represented among the divisions of the American Psychological Association is also shown.

29. Quartermaster Equipment and Supplies

No entries

30. Research and Research Equipment

AD-296 326 Div. 30, 26
CFSTI Price: HC$4.00

Nortronics Div., Northrop Corp., Anaheim, Calif.
DEVELOPMENT OF TECHNIQUES FOR PREDICTION OF SYSTEM EFFECTIVENESS.
Final rept.,
by John C. O'Brien. 25 Jan 63, 101p Rept. no. NSS-2360
Contract AF30 602 2730
RADC TDR-62 540; N64 21460
Unclassified report

Available copy will not permit fully legible reproduction.
See also AD-613 284, AD-613 285, and AD-613 289.

Descriptors: (*Data processing systems, Effectiveness), (*Quality control, Data processing systems), (*Mathematical prediction, Data processing systems), Acceptability, Command and control systems, Control systems, Models (Simulations), Energy, Probability, Partial differential equations, Reliability, Analysis, Mathematical models.

An effective solution to the problem of quantifying system quality is presented. Techniques for prediction of future performance quality are developed. A long-standing need for a satisfactory tool for this purpose has generated a strong incentive to develop an acceptable methodology. The power of the mathematical and physical modeling developed (called SPAN) is due to the use of a comprehensive metric of performance, comprising both energy and 'bound' information measures. SPAN's ability to integrate these factors into a consistent performance descriptor is based on well-known laws of potential energy and probability theory. A calculus of system performance dynamics, compatible with the SPAN metric, is directly obtainable from Laplace's and Helmholtz' equations for energy flow, by inserting the information content of the constraining pattern. The feasibility of simulating a system defined in SPAN terminology by an electrical network is demonstrated. Applications of the SPAN methodology to typical problems of command and control systems, such as reliability, maintainability, and accuracy, are shown. (Author)

AD-425 568 Div. 30, 18
CFSTI Price HC$5.00

Electro-Optical Systems, Inc., Pasadena, Calif.
STUDY OF FACT CORRELATION FOR INTELLIGENCE ANALYSIS.
Final rept.,
by Robert E. Wall, Jr. Nov 63, 198p
Contract AF30 602 2383, Proj. 4594, Task 459403
RADC TDR-62-384
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Artificial intelligence, Correlation techniques), (*Military intelligence, Data processing systems), Machine translation, Pattern recognition, Computer logic, Classification, Mathematical analysis, Factor analysis, Language.

The study of Fact Correlation refers to investigation techniques for the recognition and classification of significant words, sentences, and concepts and their subsequent correlation into a summary of the facts relevant to a stated request. This report includes a summarization of previous work relevant to this area of investigation and presents analysis and data contributed by the present authors. The investigation has focused upon structuring a classification space, use of different scales and experimental analysis of these scales, and application of various mathematical techniques to analysis of the data. The latter includes application of D-Method Orthogonalizations, Centroid Factor Analysis, Maximum Likelihood Analysis, and study of precision in locating concepts. Included also is a study of the grammatical structure of the data within the frameworks of the Phrase Structure and Transformational models of linguistic structure, and a study of the relationship of these properties to concepts analyzed with factorial measurement techniques. (Author)

N65-15892 Div. 30, 12
CFSTI Prices: HC$2.00 MF$0.50

George C. Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
VACUUM SYSTEM SIMULATION AND MULTIPORT SYSTEM FEASIBILITY STUDY,
by C. T. Egger and J. B. Gayle. 8 Dec 64, 32p
NASA TMX-53175
Unclassified report

Descriptors: (*Vacuum, Systems engineering), (*Laboratory equipment, Vacuum), (*Systems engineering, Simulation), Mathematical models, Feasibility studies, Performance (Engineering), Diffusion pumps, Analog computers.

The pumpdown, degassing, and ultimate vacuum characteristics of single and multiport vacuum systems under various operating conditions are compared by means of a mathematical model and electrical analog computer simulation. Using this technique, it was shown that a large multiport vacuum system employing a large diffusion pump is feasible and affords a number of advantages not attainable in an array of individual single-chamber systems of nomially similar capabilities. Experimental data for an existing single-chamber laboratory system are in close agreement with performance characteristics predicted by the simulation method. (Author)

OTR-114 Div. 30, 26
CFSTI Price: HC$0.50

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
ULTRASONIC TESTING OF MATERIALS.
May 65, 15p Unclassified report

In cooperation with United States Testing Co., Inc., Hoboken, N. J.

Descriptors: (*Non-destructive testing, Ultrasonic radiation), (*Ultrasonic radiation, Non-destructive testing), (*Materials, Non-destructuve testing), Test methods, Test equipment, Standards, Stresses, Fatigue (Mechanics), Structures, Bibliographies, Abstracting.

Significant reports covering the period since 1962 were selected for this study, with reference to relevant earlier works. Recent government R and D has generally proceeded along three lines: development of instruments, techniques and standards; applications of ultrasonics to measuring stress and fatigue; and applications to filament-wound structures, nuclear reactor elements, and concrete structures. (Author)

Patent 3,174,278 Div. 30, 25

CONTINUOUSLY OPERATING INDUCTION PLASMA ACCELERATOR.
Patent assigned to NASA,
by Raymond L. Barger, Joseph D. Brooks and William D. Beasley. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Plasma medium, Acceleration), Gas ionization, Inductance, Coils, Radiofrequency generators, Tuning devices, Ion engines, Pumping (Electronics), High frequency, Supersonic flow, Magnetic fields, Patents.

The plasma accelerator is capable of producing supersonic speeds. The induction principle is utilized. By using an auxiliary high frequency coil to maintain an ionization chamber, the maximum output from the driver coil is utilized. The magnetic lines linking the ionized gas are directed radially.

Patent 3,174,335 Div. 30

WIND TUNNEL SEAL.
Patent assigned to Army,
by Oscar C. Holderer. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Rubber seals, Wind tunnels), (*Wind tunnels, Rubber seals), Patents, Gas seals, Wind tunnel nozzles, Inflatable structures.

The seal is utilized in a wind tunnel. The wind tunnel is for aerodynamic testing. The continuous seal is in the form of an inflatable sealing tube disposed in a groove extending around the peripheries of each of a pair of nozzle blocks. A pair of removable annular plates are provided in recesses at one end of each nozzle block to facilitate the replacement of the sealing tubes.

Patent 3,175,211 Div. 30

INTERMITTENT DIGITAL READOUT.
Patent assigned to Navy,
by Dan Y. Lee and Robert L. Hopton. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Display systems, Meters), (*Digital systems, Display systems), (*Meters, Signals), Amplifiers, Feedback, Networks, Attenuation, Engines and motors, Patents.

The intermittent digital readout is adapted for a portable signal measuring instrument. The apparatus includes a differential amplifier, a driver amplifier, a power amplifier, a motor, a digital counter and a feedback network.

Patent 3,176,222 Div. 30

APPARATUS HAVING COAXIAL CAPACITOR STRUCTURE FOR MEASURING FLUID DENSITY.
Patent assigned to NASA,
by Eugene A. Atkisson. 30 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Densimeters, Fluids), (*Fluids, Densimeters), Liquids, Gases, Mixtures, Capacitors, Instrumentation, Capacitance, Patents.

The device is for measuring the density of compressible fluids such as liquid hydrogen. It consists of a series of plates including an air dielectric capacitor which is placed in the fluid to be measured. The fluid that thus fills the space between the plates of the capacitor causes a change in the capacitance which is recorded by an indicator of a bridge circuit which is connected to the capacitor. Using the Clausius and Mosotti relationship, the indicator can be calibrated to read density directly, though the capacitor is actually measuring change of capacitance.

Patent 3,176,499 Div. 30, 26

HIGH TEMPERATURE TESTING APPARATUS.
Patent assigned to NASA,
by Paul F. Sikora. 6 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Test equipment, Tensile properties), (*Refractory materials, Test equipment), Patents, High-temperature research.

The apparatus is for high temperature tensile testing of small samples of refractory material. A load train is provided for applying opposed forces along the longitudinal axis of an elongated specimen of refractory material to provide a tension load when the specimen is mounted to a chamber. This chamber has a fixed section that is rigidly mounted on the base for the load train and a movable section that is hingedly mounted on the fixed section for providing access to the chamber. A vacuum pump is connected to the chamber to lower the pressure therein and a heater is provided for raising the temperature of the specimen to a predetermined value.

PB-167 024 Div. 30
CFSTI Prices: HC$5.00 MF$1.00

TRW Space Technology Labs., Los Angeles, Calif.
COMPUTER ASSOCIATIVE MEMORY STUDY.
Final rept.
15 Jul 64, 165p Rept. no. 8449-6002-SU000
Contract AF04 695 318
SSD TDR-64-188; AD 442 950
Unclassified report

Descriptors: (*Data storage systems, Reviews), (*Digital computers, Pattern recognition), (*Pattern

recognition, Digital computers), Computers, Airborne, Data processing systems, Track-while-scan, Hypervelocity projectiles, Interception.

Work done in the Computer Associative Memory Study Program is described. The object was to determine whether use of an Associative Memory would be of value in spaceborne computing problems. The results of the study are that a class of spaceborne problems exist for which computers with Associative Memories present overall advantages over computers with convential memories. Problems discussed include hypervelocity intercept problems involving track-while-scan operations, Elint processing and Pattern Recognition data processing. The applications utilize the Associative Memory in an Associative Processor; that is, for the performance of parallel processing operations in the memory. An efficient and powerful design for an Associative Processor based on a plated wire memory is described. (Author)

PB-167 187 Div. 30, 20
CFSTI Prices: HC$2.00 MF$0.50

Naval Radiological Defense Lab., San Francisco, Calif.
CALIBRATION OF HIGH-INTENSITY Co(60) SOURCES AT CAMP PARKS AND SOME RELATED FIELD MEASUREMENTS,
by C. K. Menkes. 9 Nov 64, 38p USNRDL-TR-794
Proj. SF011 05 11, Task 0503
AD 454 477

Unclassified report

Descriptors: (*Radioactive isotopes, Calibration), (*Gamma rays, Ranges (Establishments)), Test facilities, Cobalt, Dosimeters, Radiation monitors, Radiological dosage, Environmental test, Gamma-ray scattering.

Five high-intensity Co(60) gamma sources at the outdoor Irradiation Range in Camp Parks were calibrated and some measurements made on dose distributions and scattering contributions to direct dose. These measurements utilized dosimeters both energy-dependent and independent to give an indication of the degree of energy degradation of the primary gamma beam with distance. The vertical dose distribution to 5 ft in height off the ground was examined as a function of horizontal distance from the source. Boundaries of the inverse square falloff region are delineated and some limitations set on extrapolating the results. All five sources were found to be somewhat below their curie rating though the four track sources were uniform to within 5 percent of each other. The tower source, however, proved to have a curie rating of about 1050, or approximately one third that of the track sources at the time of calibration. (Author)

PB-167 191 Div. 30
CFSTI Prices: HC$2.00 MF$0.50

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
PRELIMINARY EVALUATION OF THE COULTER COUNTER PARTICLE SIZE INSTRUMENT,
by Doris E. Middlebrooks, Seymour M. Kaye, David J. Edelman, and Garry Weingarten. Oct 63, 31p Technical memo no. TM-1054
Proj. 5S04 01 027
AD 420 767

Unclassified report

Descriptors: (*Particle size, Counting methods), Instrumentation, Particles, Distribution, Statistical analysis, Tests.

The Coulter Counter is reasonably easy to operate when compared with other commercial instruments designed to provide particle size distributions. With 0-30 micron spherical glass beads, geometric mean values and standard deviations with a precision of ±0.4 micron and ±0.03, respectively, are obtained. This compares with ±0.4 micron and ±0.04 for Sharples Micromerograph. The Coulter Counter has poor accuracy in comparison with microscopic data. The geometric mean values it yields (22.8 microns) are greater than those obtained microscopically (11.2 microns). Proportionately smaller particle size differences are observed toward the coarse tail of the curve and proportionately larger differences toward the fine tail. Samples may be prepared for Coulter Counter particle distribution analysis with little difficulty once the electrolyte has been selected. The reduction of the data is time consuming because of the quantity involved; however, such reduction can be simplified by using appropriate tables. Servicing is more frequently needed than with the Micromerograph. (Author)

PB-167 194 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Lowell Technological Inst. Research Foundation, Mass.
INSTALLATION OF FACILITIES TO BE USED IN CONJUNCTION WITH A SHOCK TUBE.
Final rept. for 17 Apr 61-30 Apr 64,
by Kenneth L. Rogers. Apr 64, 18p
Contract AF19 604 8481, Proj. 8635, Task 863503
AFCRL 64-657; AD 445 896

Unclassified report

Descriptors: (*Shock tubes, Installation), (*Test facilities, Shock tubes), Safety, Installation, High-speed cameras, Systems engineering, Structures, Safety devices, Instrumentation, Research program administration, Design.

This report describes the design, construction, and the installation of a shock tube facility. The design and construction of a photographic process area is also described. The general technique of strengthening walls, protecting service lines, and personnel is illustrated. Also shown are details of a wave speed camera and its auxiliary equipment. (Author)

PB-167 294 Div. 30
CFSTI Prices: HC$2.00 MF$0.50

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
A UNIVERSAL DATA PROCESSING SYSTEM FOR THE MARK I AEROSPACE SYSTEMS ENVIRONMENTAL CHAMBER,
by Ralph E. Klautsch and James W. Shenk.
Jun 64, 38p AEDC-TDR-64-123
Contract AF40 600 1000, Proj. SM4408X
AD 441 189

Unclassified report

Descriptors: (*Data processing systems, Space environmental conditions), (*Simulators, Space environmental conditions), (*Space environmental conditions, Test facilities), Altitude chambers, Space flight, Input-output devices, Telemetering data, Frequency modulation, Data storage systems, Display systems, Analog-to-digital converters, Digital-to-analog converters, Digital systems, Digital computers.

A data processing system, designed specifically to accommodate the vehicle instrumentation test requirements of a large environmental space simulation chamber,

is the subject of this report. Prominent features of the system include a versatile input section capable of accepting FM/FM, PCM, and PAM/PDM telemetry signals and analog information; a stored program analog sequencer and telemetry decommutator; a data compressor; and an on-line computer. Primary emphasis in system design has been placed on flexibility and versatility. Reasons for this emphasis are presented with views on system utilization. (Author)

31. Ships and Marine Equipment

Patent 3,178,269 Div. 31, 16, 26

CARBON DIOXIDE ABSORPTION MANIFOLD.
Patent assigned to Navy,
by William E. McConnaughey. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Submarines, Carbon dioxide), (*Carbon dioxide, Absorption), (*Air pollution, Submarines), (*Absorption, Carbon dioxide), Gas filters, Lithium compounds, Hydroxides, Dust, Filters (Fluid), Blowers, Patents, Life support, Decontamination.

The device is for removing carbon dioxide from the atmosphere without the attendant release or production of noxious chemicals. It is for use in a submerged submarine. The device includes a housing, inlets, canisters containing lithium hydroxide, a blower, a filter and an outlet.

PB-167 181 Div. 31, 14
CFSTI Prices: HC$2.00 MF$0.50

Sturm (George W.) and Associates, Washington, D. C.
THE FEASIBILITY OF UTILIZING ELASTOMER BAGS OR DIAPHRAGMS IN SHIPS' DOUBLE BOTTOMS TO SEPARATE THE BALLAST WATER FROM THE FUEL OIL.
Mar 64, 48p
Contract MA3379
Unclassified report

Available copy will not permit fully legible reproduction. Also entitled 'Plastic Bags in Ship's Double Bottoms'.

Descriptors: (*Elastomers, Ballast tanks), (*Ballast tanks, Fuel contamination), (*Bags (Containers), Ballast tanks), (*Diaphragms (Mechanics), Ballast tanks), Cargo ships, Fuel oil, Sea water, Separation, Plastics, Ships hulls, Design, Construction, Pipes, Mechanical drawings, Storage.

The report includes: A study of the materials available for the diaphragm and bags, and their characteristics; The number, design, shape, arrangement, and construction of the diaphragms and bags; Structural modifications to the hull; Ship's piping modifications; Additional equipment; Estimated weights; Estimated costs; Effect on stability and ship operation; Recommendations. Plans are also included showing typical double bottom cells, the location of existing pipes, the space remaining for diaphragms and bags, the design of the bags and diaphragms, and the necessary modifications to the piping and manifold arrangements. (Author)

PB-167 212 Div. 31, 27
CFSTI Prices: HC$5.00 MF$1.00

Taggart (Robert) Inc., Falls Church, Va.
THE USE OF MANEUVERING PROPULSION DEVICES ON MERCHANT SHIPS,
by Seth Hawkins, Robert Taggart, and Edgar D. Hoyt.
21 Jan 65, 176p Rept. no. RT-8518
Contract MA3293
Unclassified report

Descriptors: (*Merchant vessels, Marine surface propulsion), (*Marine surface propulsion, Maneuverability), Thrust, Feasibility studies, Economics, Costs, Propellers (Marine), Hydrodynamic configurations, Ship structural components, Ship hulls, Marine rudders, Marine engineering.

Contents: The use of maneuvering propulsion devices on merchant ships, Technical considerations in the selection of a maneuvering propulsion device, Ship response to external and internal forces, Practical considerations in the selection of a maneuvering propulsion device, Economic considerations in maneuvering device application, Maneuvering propulsion device selection procedure.

32. Miscellaneous Arts and Sciences

AD-434 370 Div. 32
CFSTI Price: HC$2.00

RAND Corp., Santa Monica, Calif.
THE POLITICAL EFFECTS OF ECONOMIC PROGRAMS: SOME INDICATIONS FROM LATIN AMERICA,
by Charles Wolf, Jr. Feb 64, 45p
Rept. no. RM-3901-ISA
Contract SD79, ARPA Order 189 61
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Economics, Political science), (*Political science, Economics), Banking, Analysis of variance, Growth, Measurement, Brazil, Mexico, Argentina, Chile, Haiti, Dominican Republic, Nicaragua.

The study makes use of political data derived from research by Russell H. Fitzgibbon of the University of California at Los Angeles. On four occasions (1945, 1950, 1955, and 1960), Fitzgibbon conducted a survey among specialists on Latin America to obtain an evaluation of the political climate and the character of political institutions in the individual Latin American countries. From these data it is possible to rank the Latin American countries according to: (1) the level of political democracy, and (2) the change in this level relative to the other Latin American countries, based on the subjective estimates of the survey respondents. Each of these political rankings is compared successively with several economic indicators in the Latin American countries over the 1950-1960 period. Three of these variables (GNP, gross investment, and total U. S. economic aid), are related to the economic size of the individual countries, and appear to be significantly associated with the level of political democracy. There does not appear to be any significant relationship between the Fitzgibbon measure of political change and either total economic aid, per capita aid, GNP, per capita GNP, rate of growth in GNP and in per capita GNP, or gross investment.

PB-167 185 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

Linguistics Research Center, Univ. of Texas, Austin.
AUTOMATIC CLASSIFICATION SYSTEM USER'S MANUAL,
by Nell Dale. Nov 64, 24p LRC-64-TTM-1
Grant NSF GN308
Unclassified report

Descriptors: (*Subject indexing, Automatic), (*Classification, Automatic), Information retrieval, Instruction manuals, Punched cards, Programming languages.

A FORTRAN IV programming package for experimentation in automatic classification is described from the standpoint of the user. Various options are provided in measuring similarity among individual objects or properties, and in locating groups of objects or properties that are similar in some sense (i.e. GR, Kor D-clumps). (Author)

PB-167 291 Div. 32
CFSTI Prices: HC$3.00 MF$0.75

Consumers Union of U. S., Inc., Mount Vernon, N. Y.
STANDARDS AND THE CONSUMER; A SPECIAL REPORT TO THE NATIONAL BUREAU OF STANDARDS.
31 Oct 64, 89p
Unclassified report

Descriptors: (*Economics, Standards), (*Standards, Economics), United States Government, Consumption, Food, Agriculture, Drugs, Toilet articles, Law, Public health, Commerce, Hazards, Labels, Alcohols, Standardization, Quality control, Sanitary engineering, Packaging, Tests, Materials, Costs.

Contents: Section I The Concept of Standards: Standards of configuration; Standards of quality; Standards of dimension; Standards of nomenclature. Section II Consumer Standards in the United States Today: Food standards: Agricultural Research Service; Agricultural Marketing Service; Food and Drug Administration; Public Health Service; Other Federal Agencies: Standardization of alcoholic beverages; Hazardous Substances Labeling Act; Drug standards; Consumer standards in other areas: National Bureau of Standards; American Society for Testing and Materials; American Standards Association. Section III Discussion and Conclusions. Section IV The Impact of Consumer Standards: General Considerations; Economic Concomitants.

PB-167 302 Div. 32

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
POTENTIALITIES OF AUTO-ENCODING OF SCIENTIFIC LITERATURE.
Research rept.
by H. P. Luhn. 15 May 59, 25p Rept. no. RC-101
Unclassified report

Document is not reproducible and is available from the Clearinghouse on loan only.

Descriptors: (*Reports, Information retrieval), (*Subject indexing, Reports), (*Abstracting, Reports), Documentation, Dictionaries, Indexes, Vocabulary, Automation, Automatic, Statistical analysis.

The introduction of mechanical devices for the processing of scientific information raises the question as to the extent to which machines will be able to assist in the selection, storage, dissemination and retrieval of information. In order to appreciate fully the functions that information processing machines are capable of performing in this area a number of typical operations are presented and their potential usefulness to the development phase as well as operational phases of information systems is explored. The solution of particular problems is illustrated by way of examples based on the availability of scientific literature in machine-readable form. The examples cover the compilation of word lists, establishment of word relationships, the preparation of word patterns for retrieval and the compilation of dictionaries and thesauri. Some of the results of Information Retrieval Research at the IBM Research Center are presented in the form of machine print-outs such as the keyword-in-context index for bibliographies, the auto-abstract, the word pair matrix, derived code words, and the statistical analysis of a document. (Author)

PB-167 303 Div. 32
CFSTI Prices: HC$2.00 MF$0.0

International Business Machines Corp., Poughkeepsie, N. Y.
SUPERIMPOSED CODING WITH THE AID OF RANDOMIZING SQUARES FOR USE IN MECHANICAL INFORMATION SEARCHING SYSTEMS,
by H. P. Luhn. 15 Jun 56, 29p Unclassified report

Descriptors: (*Information retrieval, Coding), (*Coding, Information retrieval), Automatic, Punched cards, Magnetic tape, Punched tape.

Superimposed coding is the technique of recording a plurality of units of information in a common coding field for making them available for simultaneous analysis. This technique produces secondary code combinations which, while unintended, might nevertheless represent valid codes. Such occurrences are minimized if the code combinations used have, as a set, the property of randomness. The encoding method described in this paper brings about this property by a standard operation. This eliminates the necessity of arbitrarily assigning random numbers to given terms and of maintaining a dictionary of such assignments. With the new methods, the randomized designation becomes a function of the original term and may therefore uniquely be derived when or wherever required. The paper also contains a description of the ELCO (eliminate and count) code, another form of encoding derived by standard procedures rather than by assignment. (Author)

PB-167 319 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautical Lab., Bangalore (India).
NON-SEMINAL MNEMONICS (MNEMONICS IN CLASSIFICATORY LANGUAGE 1) (DEPTH CLASSIFICATION 38),
by Abdul Rahman and T. Ranganathan. 1962, 14p
Unclassified report
Pub. in Annals of Library Science v9 n1 p1-14 Mar 1962.
Available copy will not permit fully legible reproduction.

Descriptors: (*Classification, Language), (*Language, Classification), Memory, India, Information retrieval.

Distinguishes between General Mnemonics and Restricted Mnemonics used as aid to memory. Examines four kinds of Scheduled Mnemonics and also Systematic Mnemonics. The latter is a new kind of mnemonics. Makes a comparative study of the incidence of five kinds of mnemonics in CC (Colon Classification) and DC (Decimal Classification). (Author)

PB-167 320 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

Center for the Information Sciences, Lehigh Univ., Bethlehem, Pa.
STUDY OF THEORIES AND MODELS OF INFORMATION STORAGE AND RETRIEVAL: GRAPHS AND ALGORITHMS FOR TERM RELATIONS,
by Donald J. Hillman. 30 Jul 64, 24p
Rept. no. R-7 Unclassified report
Grant NSF GN283

Descriptors: (*Subject indexing, Classification), (*Reports, Documentation), Graphics, Topology, Model theory, Mathematical analysis, Information retrieval, Mathematical logic, Theory, Set theory, Theorems.

An algorithm is presented for grouping the terms of a document corpus into genera, and it is shown that the different genera of the graph G = (T, M), where T is the set of index terms and M the reflexive, symmetrical relation of matching, constitute a partition of T. An effective method is next described for discovering the orderings of terms within each genus. It is then shown that every genus is a topological space, and a technique is formulated for assigning neighborhoods to terms. An algorithm is next described for forming the concepts contained in a given genus, so that the formal theory of retrieval described in earlier reports is now susceptible of empirical corroboration. (Author)

PB-167 321 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

Center for the Information Sciences, Lehigh Univ., Bethlehem, Pa.
MATHEMATICAL THEORIES OF RELEVANCE WITH RESPECT TO THE PROBLEMS OF INDEXING: THE FORMAL BASIS OF RELEVANCE JUDGMENTS,
by Donald J. Hillman. 9 Jul 64, 24p Rept. no. R-1
Grant NSF GN177
Unclassified report

Descriptors: (*Subject indexing, Classification), (*Reports, Documentation), Information retrieval, Topology, Mathematical analysis, Mathematical logic, Linear systems, Theory.

The foundations of a mathematical theory of relevance are described, and a connection established with the topological theory of retrieval constructed in Report No. 6 of Study of Theories and Models of Information Storage and Retrieval (PB-163 750). A basic matching predicate is given a concrete interpretation via an index term association matrix developed by Giuliano and Jones (Vincent Giuliano and Paul Jones. 'Linear Associative Information Retrieval,' Chapter 2 in Vol. 1 of 'Vistas in Information Handling,' P. Howerton and D. Weeks, editors, Washington, Spartan Books, 1963), and the mathematical properties of matching are set forth. On the basis of the interpreted predicate, index terms are sorted into groups of conceptually related items, concepts themselves are defined, and actual techniques for assessing relevance are described. (Author)

PB-167 356 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

IBM Advanced Systems Development Div., Yorktown Heights, N. Y.
THE AUTOMATIC DERIVATION OF INFORMATION RETRIEVAL ENCODEMENTS FROM MACHINE-READABLE TEXTS,
by H. P. Luhn. 6 Sep 59, 11p Unclassified report
Rept. presented at the Internation Conference for Standards on a Common Language for Machine Searching and Translation, Cleveland, Ohio, 6-12 Sep 59.

Descriptors: (*Information retrieval, Subject indexing), (*Subject indexing, Automatic), Reports, Indexes, Language, Computers, Subject analysis, Vocabulary.

The problem of organizing scientific and technical literature for purposes of information retrieval may be alleviated either by (1) the adoption of a common machine coding language to avoid conflicts and duplication or (2) the development of completely automatic methods for deriving clues to document contents. In arguing for the latter course, this paper reviews some of the drawbacks of the common-language approach and suggests several approached to automation based on statistical methods. These include the derivation of similarity coefficients from word-frequency lists and indexing by the automatic printout of key words in their context. (Author)

PB-167 361 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

International Business Machines Corp., Poughkeepsie, N. Y.
IDENTIFICATION OF GEOMETRIC PATTERNS BY TOPOLOGICAL DESCRIPTION OF THEIR ENVELOPES.
Technical rept.,
by H. P. Luhn. 23 Apr 56, 7p
Unclassified report
See also PB-167 368.

Descriptors: (*Geometric forms, Coding), (*Coding, Geometric forms), (*Computers, Coding), Topology, Information retrieval, Linear systems.

The use of electronic equipment in the field of literature searching and of correlation of information has pointed up the need of linear notations for multi-dimensional representations such as chemical structures. This paper proposes a notation for the identification of geometric patterns such as used for representing chemical structures. The notation is based on a topological description of the envelop enclosing such configurations. (Author)

PB-167 362 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

IBM Advanced Systems Development Div., Yorktown Heights, N. Y.
KEYWORD-IN-CONTEXT INDEX FOR TECHNICAL LITERATURE (KWIC INDEX),
by H. P. Luhn. 31 Aug 59, 19p
Rept. no. ASDD-RC-127
Unclassified report

Descriptors: (*Reports, Indexes), (*Indexes, Reports), (*Subject indexing, Information retrieval), Computers, Automatic, Bibliographies.

A distinction is made between bibliographical indexes for new and past literature based on the willingness of the user to trade perfection for currency. Indexes giving keywords in their context are proposed as suitable for disseminating new information. These can be entirely machine-generated and hence kept up-to-date with the current literature. A compatible coding scheme to identify the indexed documents is also proposed. In it elements are automatically extracted from the usual identifiers of the document so that the coded identifier yields a maximum of information while remaining susceptible to normal methods of ordering. (Author)

PB-167 367 Div. 32, 30
CFSTI Prices: HC$2.00 MF$0.50

IBM Research Center, Yorktown Heights, N. Y.
ROW-BY-ROW SCANNING SYSTEMS FOR IBM PUNCHED CARDS AS APPLIED TO INFORMATION RETRIEVAL PROBLEMS,
by H. P. Luhn. 8 May 59, 42p Unclassified report
Research rept. no. RC-100

Descriptors: (*Punched cards, Information retrieval), (*Information retrieval, Punched cards), (*Optical scanning, Punched cards), Wiring diagrams, Coding, Electronic equipment.

Row-by-row scanning is a method by which a plurality of items of information, recorded on cards, may be presented for analysis in serial order. As many as 12 rows of such information may be recorded on a card. Unlike the normal processing of punched cards the process of scanning does not depend on the recognition of individual numerals or letters for subsequent storage in a machine. It is necessary to ascertain only whether a given hole pattern is present or not in any of the rows. Alphabetic or numeric information may be spelled out character by character and may therefore be uniquely matched during the scanning process, thereby eliminating incidences of false selection. It is possible to express relationships amongst recorded items in many ways, to indicate ranges of values, alternative conditions and many other features. The recorded inforformation may always be recovered, which is not possible in superimposed coding schemes.

PB-167 368 Div. 32, 30
CFSTI Prices: HC$1.00 MF$0.50

IBM Research Center, Yorktown Heights, N. Y.
A SERIAL NOTATION FOR DESCRIBING THE TOPOLOGY OF MULTIDIMENSIONAL BRANCHED STRUCTURES (NODAL INDEX FOR BRANCHED STRUCTURES).
Research rept.,
by H. P. Luhn. 12 Dec 55, 19p Rept. no. RC-27
Unclassified report

Descriptors: (*Graphics, Coding), (*Coding, Graphics), Documentation, Topology, Mechanical drawings, Electrical networks, Circuits, Linear systems, Numbers, Information retrieval.

The application of machines to the processing of general information, such as in information retrieval, has led to the need for more rigid systems for recording and encoding such information. This type of information may include pictorial representations of many kinds. This paper outlines an approach to the encoding of one category of these representations, and probabilistic systems of notations of varying degrees of accuracy are given. The systems refer to branched and interconnected arrays of linear elements, such as used in delineating chemical structures, the flow of processes, or the assembly of mechanical and electrical circuit elements. A primary objective of these systems is to derive a linear notation which permits the discovery of inclusion of a given structure in another structure by serial comparison of the elements of the respective notations (serial scanning). Such serial comparisons may be performed by machines without the aid of an internal memory. Another objective is the derivation of a unique notation for purposes of identification. (Author)

PB-167 369 Div. 32, 30
CFSTI Prices: HC$1.00 MF$0.50

Pittsburgh Univ., Pa.
INFORMATION RETRIEVAL,
by Charles R. T. Bacon. 1962, 21p
Technical rept. no. TR-1
Unclassified report

Descriptors: (*Information retrieval, Programming (Computers)), (*Programming (Computers), Information retrieval), Subject indexing, Vocabulary, Language, Reports.

Descriptions, listings, and examples of 6 programs for the IBM 650 computer are given, comprising a method for (1) scanning text material, and preparing a concordance; (2) retrieving the scanned documents according to commands involving Boolean combinations 'and,' 'or,' and 'and-not.' By the use of 432 documents, containing some 55,000 words, about half of which are 'common,' for example, all documents may be found which contain the words 'TAX', 'TAXATION', 'TAXABLE', 'TAXED', 'TAXES', or 'TAXING', and the words 'EXEMPT', 'EXEMPTION', 'EXEMPTED', or 'EXEMPTS'; or the words 'TAX-FREE', 'TAX-EXEMPT', or 'NON-TAXABLE'; but not containing the words '1959', '1958', '197', or '1956'. The numbers, between 000 and 432, assigned as identification to these documents, may be printed, or merely counted, to tell whether printing is feasible; or the citations (title lines) may be printed; or the documents may be printed out in their entirety. This procedure for the IBM 650 would seem to be adequate for about one thousand documents, averaging one hundred words per document; no editing of the concordance is assumed.

33. Transportation

PB-167 182 Div. 33, 13
CFSTI Prices: HC$5.00 MF$1.25

Stanwick Corp., Washington, D. C.
PROJECT CULDESAC: CONCEPTS FOR CARGO HANDLING AT PRIMITIVE PORTS.
Jan 64, 186p Unclassified report
Contract MA3371

Descriptors: (*Harbors, Cargo), (*Cargo, Handling), Helicopters, Containers, Costs, Towed bodies, Inflatable structures, Adapters, Positioning devices (Machinery), Hoists, Booms.

Concepts for the transfer of limited quantities of general cargo at primitive ports are presented. These concepts were investigated with respect to economic and technical feasibility. Of the concepts studied, the simplest (towing cargo from an offshore ship packed in watertight containers) also resulted in the greatest cost advantage. Except for a few particular situations, the other techniques studied resulted in little or negative cost advantage. The cost advantage offered by the concept of towing the cargo to the pier via watertight containers resulted in cost advantages varying from $16/ton for 50 tons transferred to $6.86/ton for 500 tons transferred. The cost advantage of the towed watertight containers over conventional lightering amounts to $7.40/ton. All systems studied were considered practical except for the Fully Automatic Shuttle Transfer (FAST) which, because of operational factors, was considered marginal for commercial operations. (Author)

PB-167 200 Div. 33
CFSTI Prices: HC$7.00 MF$2.00

Bureau of Public Roads, Washington, D. C.

PROCEEDINGS OF HIGHWAY CONFERENCE ON THE FUTURE OF RESEARCH AND DEVELOPMENT IN TRAFFIC SURVEILLANCE, SIMULATION AND CONTROL, SEPTEMBER 14-15, 1964,
15 Sep 64, 387p

Unclassified report

Descriptors: (*Traffic, Symposia), Simulation, Control systems, Automatic, Effectiveness, Management planning, Systems engineering, Operations research, Urban areas, Aerial photographs, Data, Reviews, Distribution, Roads.

The theme of the conference was the evaluation of present progress and future prospects in the research and development of procedures and equipment for use in the related fields of traffic surveillance, traffic simulation and traffic control. Representatives from organizations having experience in one or more of these areas presented papers and discussions. Highlighted was the application of the 'state of the art' to actual highway systems, both existing and proposed in order to improve safety and operations and to reduce construction and operating costs of highways. The report contains the text of the 33 papers presented at the conference.

PB-167 382 Div. 33, 1
CFSTI Prices: HC$4.00 MF$1.00

Airborne Instruments Lab., Deer Park, N. Y.
CAPACITY OF AIRPORT SYSTEMS IN METROPOLITAN AREAS. METHODOLOGY OF ANALYSIS.
Final rept.,
by M. A. Warskow and I. S. Wisepart. Jan 64, 116p
Rept. no. AIL-1400-4
Contract FAA BRD403

Unclassified report

Descriptors: (*Airports, Urban planning), (*Urban planning, Airports), Air traffic, Urban areas, Operation, Scheduling, Factor analysis.

Since airports in metropolitan areas complement and interact with each other, they must be planned and operated as part of a system of airports. Furthermore, as air traffic continues to increase, more airports in metropolitan areas approach and reach capacity operation. Therefore, it is desirable to plan each airport in a metropolitan area as part of a system of airports in order to obtain the most efficient traffic flow, as well as the most efficient use of facilities. The operational factors involved in planning a system of airports in metropolitan areas are analyzed and used to determine the causes of congestion. Data obtained from previous studies is used to understand and demonstrate the operational factors and congestion. Airport congestion is defined in quantitative form for an individual airport and a system of airports. A methodology is presented that permits the many factors affecting the operation of an airport in a metropolitan system area to be evaluated quantitatively. The annual demand at which these airports will reach their practical annual capacity is determined by considering the effects of airport interactions and by determining quantitatively when congestion will occur at one airport and in the airport system. (Author)

PB-167 383 Div. 33, 1
CFSTI Prices: HC$2.00 MF$0.50

Airborne Instruments Lab., Deer Park, N. Y.
CAPACITY OF AIRPORT SYSTEMS IN METROPOLITAN AREAS. SUMMARY.
Final rept.,
by M. A. Warskow and I. S. Wisepart. Jan 64, 37p
Rept. no. AIL-1400-3
Contract FAA BRD403

Unclassified report

See also PB-167 382.

Descriptors: (*Airports, Urban planning), (*Urban planning, Airports), Air traffic, Urban areas, Operation, Scheduling, Factor analysis.

Since airports in metropolitan areas complement and interact with each other, they must be planned and operated as part of a system of airports. Furthermore, as air traffic continues to increase, more airports in metropolitan areas approach and reach capacity operation. Therefore, it is desirable to plan each airport in a metropolitan area as part of a system of airports in order to obtain the most efficient traffic flow, as well as the most efficient use of facilities. The operational factors involved in planning a system of airports in metropolitan areas are analyzed and used to determine the causes of congestion. Data obtained from previous studies is used to understand and demonstrate the operational factors and congestion. Airport congestion is defined in quantitative form for an individual airport and a system of airports. A methodology is presented that permits the many factors affecting the operation of an airport in a metropolitan system area to be evaluated quantitatively. The annual demand at which these airports will reach their practical annual capacity is determined by considering the effects of airport interactions and by determining quantitatively when congestion will occur at one airport and in the airport system. (Author)

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R-1	32S PB-167 321
R-403-PR	09S AD-285 651
R-7	32S PB-167 320
RADC-TDR-62-540	30S AD-296 326
RADC-TDR-62-384	30S AD-425 568
RADC-TDR-62-604	16S AD-400 345
RADC-TN-63-159	16S PB-167 023
RC-100	32S PB-167 367
RC-101	32S PB-167 302
RC-27	32S PB-167 368
RM-334	15S AD-116 551
RM-3901-ISA	32S AD-434 370
RM-3918-ARPA	14S PB-167 354
RT-8518	31S PB-167 212
SA-TR19-1508	26S PB-167 255
SR-541	09S SR-541
SSD-TDR-64-188	30S PB-167 024
TM-1054	30S PB-167 191
TM-349-127	09S PB-167 192
TM-81 2899-40-T	08S PB-167 197
TR-1	32S PB-167 369
TR-50	28S AD-069 773

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USNRDL-TR-794	30S PB-167 187
wADD-TR-60-56 P4	25S AD-272 769
wAL-401/214	17S AD-43 989
1190	09S AD-282 273
22	78S AD-275 108
23	08S AD-282 835
239-01-4-383	08S AD-416 492
25	08S AD-401 160
26	08S AD-408 626
27	08S AD-418 263
28	08S AD-423 977
397	20S AD-401 761
64-28	25S PB-167 293
8449-6002-SU000	30S PB-167 024

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ORDER NO.	DIV	HC-PRICES-MF	
AD-116 551	15S	$5.00	
AD-242 398	14S	$1.00	
AD-272 769	25S	$8.10	
AD-274 381	7S	$2.00	
AD-275 108	8S	$2.00	
AD-281 063	9S	$1.00	
AD-282 273	9S	$5.00	
AD-282 835	8S	$2.00	
AD-285 651	9S	$3.00	
AD-296 326	30S	$4.00	
AD-400 345	16S	$2.00	
AD-401 160	8S	$2.00	
AD-401 761	20S	$2.00	
AD-408 786	25S	$1.00	
AD-411 117	27S	$9.95	
AD-411 876	16S	$0.50	
AD-416 492	8S	$7.15	
AD-418 263	8S	$3.00	
AD-423 199	26S	$7.00	
AD-423 977	8S	$2.00	
AD-425 114	16S	$3.00	
AD-425 568	30S	$5.00	
AD-43 989	17S	$2.00	
AD-434 370	32S	$2.00	
AD-434 662	18S	$2.00	
AD-441 460	8S	$1.00	
AD-442 657	9S	$4.00	
AD-454 572	2S	$5.00	
AD-454 927	14S	$1.00	
AD-69 773	28S	$2.00	
OTR-112	9S	$0.50	
OTR-113	26S	$0.50	
OTR-114	30S	$0.50	
PB-166 949	9S	$2.00	$0.50
PB-167 023	16S	$3.00	$0.75
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PB-167 032	15S	$1.00	$0.50
PB-167 075	15S	$1.00	$0.50
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PB-167 111	20S	$3.00	$0.75
PB-167 113	25S	$3.00	$0.75
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PB-167 174	20S	$1.00	$0.50
PB-167 177	24S	$2.00	$0.50
PB-167 178	2S	$4.00	$1.00
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